LINNAEAN FERN BULLETIN

VOL. IV.

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Mo. Bot. Garden,
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FERN BULLETIN.

VOL. IV. JANUARY, 1896. NO. 1.

FERNS OF MOUNT TOBY.

THIS mountain, situated partly in Sunderland and partly in Leverett, Mass., has the reputation in this vicinity of being a fern-lover's paradise To prove the truth of this popular belief, two of us set out for the mountain on our wheels from Greenfield during the second week in September. The two ferns that we most desired to find were Dryopteris Goldieana and Asplenium angustifolium—ferns that have not been mentioned in any of the Bulletins thus far published. By following the directions of a friend, we found the two ferns near Roaring Brook, on the east side, with little difficulty.

This side of the mountain is very precipitous with here and there immense blocks of massive pudding stones. At the foot of the hill where these ferns grow the ground is moist, and the soil seems to be composed of rotted leaves and debris from decayed tree trunks Decaying logs two feet or more in diameter lie strewn over the ground. Within one hundred yards of this locality we found another place where the luxuriant green sterile fronds of Asplenium angustifolium literally hid the ground beneath them from view. The fertile fronds were plentiful also, and we took with us nearly one hundred of each. Among the fertile fronds there were several with bi-parted pin-

nae, and in a few cases the tips of the frond were divided several inches. D. Goldieana is scattered through all of this region and is comparitively common near the base of the mountain. About a mile down the brook in a narrow swamp we collected over fifty specimens of Dryopteris cristata Clintoniana, a fern which to the casual observer is strikingly like D. Goldieana. Never having seen it before, we nearly missed it and in fact did pass several fine plants thinking that it was a narrow form of D. Goldieana. It differs from the latter in general appearance by being stiffer and straighter. The pinnae are shorter and broadest at the base. The plant is found at its best in much wetter situations than D. Goldieana. We gathered several specimens that were slightly more than three and a half feet in length. All along the base of the mountain Asplenium acrostichoides is very abundant, seeming to be in just the right conditions for fine growth. Comptosorus is found abundantly on many of the boulders. Cystopteris bulbifera make a fine growth here, and a large variety of fronds may be collected of it. On the side of the mountain, at an altitude of perhaps one hundred feet, there is a large bed of Ophioglossum vulgatum. —*A. T. Beals, Greenfield, Mass.*

THE FRAGRANT SHIELD FERN.

I HAD another gala day this season when with the help of a friend I found the last of our New England ferns—Dryopteris fragrans. I have spent a good many hours among our cliffs during these ten years past, hunting for this little fellow, and had given up expecting to find it. Several times I had thought it found, but it would prove to be only the Woodsia Ilvensis. There could be no possible question this time as to its identity. It was way up on the bare, dry face of the cliff, far out of reach except by some sort of a ladder. But it was so unlike any other species, with its dry, curling, snuff-colored fronds of last year, that I knew it was the one I wanted, We found more of it later that was accessible. I think that the professors

who have written our descriptions of it have never found it for themselves. Its chief characteristics are: 1st—that peculiar appearance of the old fronds; you couldn't curl them more gracefully than they appear drooping over the ledge of rocks. 2nd—the glutinous fronds; they cannot be taken from the paper until they are dry and grass and leaves adhere to them. 3rd—its peculiar fragrance. Gray says "aromatic;" that doesn't half tell the story. I gathered a clump of it on the cliff and dropped it down in my pocket handkerchief, and the perfume lasted for days. I think it is like new-mown hay composed largely of sweet briar rose leaves. Its fragrance alone makes it our best fern. It grows on the dryest cliff sides, where everything else would be scorched by the sun's heat; not "especially near waterfalls," as Gray's Manual says. Look for a place where there is a bare cliff, overhanging a little perhaps, so that the rain cannot reach it, and up above all the trees, so that it can have no shade at all, and if you find a fern there, test it by the perfume, its stickiness and its beautiful brown curls.—*James A. Bates, Randolph, Vt.*

OSMUNDA CINNAMOMEA FRONDOSA.

MY observations this season have impressed me with one remarkable peculiarity of this form, viz.: that it is only an imperfect fruitage. This is shown by the fact that it presents every stage of transition from the completely sterile to the typical fertile frond. These transition stages may be found in a single frond or in a selected series of fronds from the same or from different rootstocks. A fundamental distinction between the sterile and fertile fronds is that the pinnae of the former are once, those of the latter twice, pinnate. The first deviation of the sterile toward the fertile form would accordingly be a division of its broad, obtuse and entire lobes into many narrow lobes, and that is the actual condition discovered by examination. We may select one having the lowest pair of

pinnae exactly like those of the sterile form. The next pair will have distinctly dentate lobes, the lobes of the third pair will be cut into linear and capillary segments, a few of these having a single sporangium at the tip. The fourth and succeeding pairs show regular increase in number and perfection of the sporangia until, at about the middle of the frond, the fruit may be perfect. As the pinnae approach the top the same changes are seen in reverse order, the upper pinnae having uncut lobes like the first below. Almost invariably the nearest approach to perfect fruit is at the middle, consequently the frond that accomplishes a single step in that direction has dentate pinnae at its middle, all the others being unmodified. I do not recollect ever having found anything else that illustrates so plainly the derivation of fruiting organs from the leaf. I have always supposed a botanical variety to be a form, deviating from its specific type in certain features, but not less perfect or less constant in its characteristics than the type. Measured by that standard the forms of Osmunda that I have seen growing side by side could not be included in a dozen varieties. To me these forms seem to be "sports," not worthy of varietal distinction. Another peculiarity is the late appearance. I first saw them late in June, at which time the perfect fruit had ripened, withered and almost disappeared. The fruit on most of these imperfect fronds was still unripe, and in some cases the fronds were still unfolding. The swamp in which they grew had been burned over recently, perhaps early in the season after the ferns had begun their growth. It seems to me possible that the imperfect fruit was the result of an unseasonable effort of the plants to compensate early losses.—*C. D. McLouth, Muskegon, Mich.*

EVERGREEN FERNS.

IT is interesting to note the behavior of different ferns when cold weather comes upon us. Many are killed outright, but others last until the following year. After a frost it is useless to look for Phegopteris hexagonoptera or Dicksonia.

Adiantum pedatum survives a few frosts, but is soon brown and dead. In many ferns only the fertile fronds, or at least the fertile parts of the fronds, die in the winter. Aspidium acrostichoides is a familiar example. Lygodium palmatum, Aspidium cristatum, Woodsia obtusa, Botrychium ternatum and others act in this way. The latter species turn to a reddish bronze color, and is very much prettier than when green. When the fertile part begins to die, it is in almost all cases at the top of the frond where it begins to turn brown. The only exception to this that I know of is Lygodium palmatum. Some ferns do not seem to know whether to die or not. In Asplenium ebeneum the fertile fronds frequently die, but almost as frequently remain green the entire winter. Usually all of the fronds of this species become very much bleached and are covered with whitish spots and blotches. We notice the same thing with Woodsia obtusa at times. The fertile fronds of the latter usually die, but the only thing that seems to stop its growth is freezing weather. This fern and Asplenium Trichomanes seem to put forth the young fronds a little more on every good, warm day during the winter. Sheltered in the clefts of rocks and receiving warmth from them, since in the winter the ground is always several degrees warmer than the air, they take every opportunity to grow. The fronds of A. Trichomanes usually remain green, but one thing is quite noticeable in pressed specimens—those which are collected during the winter lose their pinnae very readily, the pinnae of summer specimens being less loosely jointed to the rachis. Of the ferns which die down in the winter the Osmundas usually lose their pinnae. It would be interesting to note whether there were changes similar to those in the leaf stems of deciduous trees and shrubs, causing the fall of the pinnae. Pellæa atropurpurea is another of the evergreen ferns, but its fronds become more or less brown in spots as the winter advances. In P. vulgare the texture of the pinnae is very loose, and in cold weather the fronds curl up, rachis as well as pinnae becoming more or less twisted together, and

the epidermis of the under side of the frond seems to separate and is very loose and wrinkled. On the return of warmer weather, the fronds resume their usual appearance. In the spring the fronds of the previous year begin to drop off. Every one has no doubt noticed that during the winter the fronds of Aspidium marginale and A acrostichoides lie for the most part flat upon the ground. On examining a stem at the base it will be seen that it is very weak and hollow except for the vascular bundles running through it. I do not know whether the snow breaks the stems and then allows water and frost to hollow it, or whether the stem is first weakened and allows the frond to fall over in such a position that the snow will protect it from too severe colds.—*C. E. Waters, Baltimore, Md.*

WINTER FERNS.

WHEN winter comes do not think the good days for collecting are all gone until spring. Except in the far north, perhaps, there are many days in winter, especially after a mild spell of weather, when one can get about in the woods, and it will pay the fern student to take such winter outings when he can. There are numerous evergreen ferns, as noted in the Manuals, some of them rare, and the comparitive bareness of the winter woods gives all the more zest to the search when most plants are hibernating. Then too. it is interesting to note the habits of these hardy plants under the changed conditions. Woodsia obtusa, which is very fond of old walls, Asplenium platyneuron, Polypodium vulgare, Dryopteris acrotichoides, D. marginalis, besides Equisetums and Lycopodiums, may be found in almost every neighborhood, giving a little dash of freshness to the cold and frozen places —*C. F. Saunders, Philadelphia.*

It is truly June when you begin to see brakes fully expanded in the wood path.—*Thoreau.*

FORKING FRONDS.

IN "Our Native Ferns," Prof. Underwood mentions seven different species which have been observed to produce fronds that fork at the summit. These are Scolopendrium, Camptosorus, Asplenium angustifolium, Cheilanthes lanosa, Gymnogramme Ehrenbergiana, Dicksonia and Pellæa atropurpurea. This does not exhaust the list by any means. Mr. A. T. Beals writes of a frond of Dryopteris acrostichoides that had five or more tips, and mentions several fronds of Asplenium angustifolium whose pinnæ as well as tips forked. In Bulletin No. 2, Mr. C. E. Waters records the forking of Cystopteris fragilis, Asplenium Trichomanes, A. montanum and A. filix-fœmina, the latter having six divided fronds out of a total of nine. In Bulletin No. 3, Mr. Geo. G. Hinsdale adds Cystopteris bulbifera to the list, making thirteen species in all. It would be interesting to know what species exhibit the greatest tendency to fork, and whether any other species do so. Those who have other instances of this kind are invited to publish them in this journal.

ORCHIDS AND FERNS.

APROPOS of the note on ferns and orchids in the October number, Mrs. M. L. Stevens writes that she has had blossom in her garden Orchis spectabilis, Habenaria fimbriata, H. lacera, H. psycoides, Goodyera repens and G. pubescens. To this list may be added several other native species that will bloom in cultivation, especially Habenaria Hookerii, Epipactis and Spiranthes. During a two weeks' stay at a small village in Maine last summer, Mrs. Stevens noted seventeen species of this interesting family, among them Arethusa, Calapogon, Pogonia, Microstylis and Liparis.

EVERYTHING is a miracle from somebody's point of view.—*Torrey.*

THE LINNÆAN FERN CHAPTER

OF THE AGASSIZ ASSOCIATION.

President's Report.

Fellow Members:—At the close of our third season's work, it is a pleasure to report that never since the beginning has the Chapter been in a more flourishing condition. The admission of twelve new members has increased our number to thirty-seven, and greater interest in the study of ferns is being manifested. One of the most successful features of the past season was the free distribution of ferns. More than a hundred specimens comprising no less than twelve different species, many of them rare, were sent to members for the mere cost of postage. When it is remembered that the collections owned by members are often large and varied the number of specimens applied for is remarkable. This distribution will be continued through the the present year. Members who are able to collect the rarer ferns and fern allies can help those who cannot by presenting a few specimens to the Chapter. Although the Bulletin has passed from the Chapter's control, all hold upon it is not to be lost, for it will continue to be our official organ and members will receive it free. In a short time the ferns will again be uncoiling in the woods and swamps, aud it is not too early now to begin preparations for collecting and studying them. It is the aim of the Chapter to help in this work in every way possible, and suggestions from members in regard to making it more useful will be welcomed by any of the officers. The Chapter desires to hear from every member at least four times a year, even if it is but a postal card telling of the season's successes. Let every member do what he can to add to our knowledge of the ferns, and the Chapter's record for the present year will be as fair as any since its organization.

WILLARD N. CLUTE, President.

Treasurer's Report.

Following is a statement of the receipts and disbursements of the Chapter for the year ending December 31, 1895:

Receipts.

By balance from 1894	$ 4 10
" dues of active members	21 98
" " " associate members	3 23
" sales of Bulletins	6 02
Total,	$35 33

Disbursements.

To Bulletin No. 8	$4 75
" " No. 9	5 94
" " No. 10	6 75
" " No. 11	6 56
" " No. 12	6 50
	$30 50
Cash on hand	4 83
	$35 33

JAMES A. GRAVES, Treasurer,
Susquehanna, Pa.

Secretary's Report.

During the year 1895 five Bulletins have been issued, including a valuable and complete checklist of the Pteridophyta of North America north of Mexico. The necessary funds were raised by the subscriptions of a number of members of the Chapter, who thus constituted a Committe of Publication. The work was greatly facilitated by the aid of Prof. L. M. Underwood, to whom the thanks of the Chapter as a whole are due.

During the year twelve new members have been added to the Chapter, and one has been lost by death. Beginning with the eleventh number of the Bulletin, the managment of that publication has been placed entirely in the hands of Mr. W. N.

Clute, who will continue to publish it as a quarterly, enlarging it as soon and as often as subscriptions sufficient to warrant such outlay can be secured. This change is sure to occasion no lessening of interest in the Chapter's welfare. The free distribution of ferns, pleasant correspondence, and more than all, the honor of belonging to the only society devoted exclusively to the study of the Pteridophyta are not to be valued in dollars and cents. Nature abhors money quite as much as she does a vacuum. C. E. Waters, Secretary, Johns Hopkins Univ., Baltimore, Md.

The Chapter Election.

The result of the November election in the Chapter is as follows: Number of active members entitled to vote, 21; number voting, 8. For president—Willard N. Clute, 7; C. F. Saunders, 1. For vice-president—Mrs. T. D. Dershimer. 5; Mrs. M. L. Stevens, 3. For secretary, C. E. Waters, 8. For treasurer, James A. Graves, 8. Mrs. Dershimer and Messrs. Clute, Waters and Graves are therefore declared elected.

Mrs. A. D. Dean, Judge of Election.

The Chapter Ferns.

The specimens presented to the Chapter this quarter for free distribution, consist of fronds of four interesting ferns, and plants of Marsilia quadrifolia. Mr. A. T. Beals sends fronds of Dryopteris acrostichoides incisa, and D. Goldieana, from the Mt. Toby locality mentioned in this issue. Prof. C. D. McLouth, of Muskegon, Mich., contributes Woodwardia virginica, and specimens of the so-called variety, frondosa, of Osmunda cinnamonea. The Marsilia is presented by Miss Esther H. Thompson, and comes from the only place in North America where it is indiginous—Bantam Lake, Conn. All the specimens are of more than usual interest. The fronds of Woodwardia so much resemble the sterile fronds of Osmunda cinnamomea and O.

claytoniana that the casual observer would never notice the difference unless the fronds were turned over showing the chain shaped rows of fruit-dots on the first one. The Dryopteris Goldieana is one of our largest ferns and is easily mistaken for a large form of D. marginalis, unless the fruit-dots are seen. The fronds of D. acrostichoides incisa, or perhaps now more properly D. a. Schweinitzii, are exceedingly fine specimens of this debatable variety. Mr. Beals writes that sterile fronds like the species and fertile ones like the variety may be picked from the same plant, and suggests that the latter may be more in the nature of "sports." The fertile fronds received, however, are certainly very distinct. They are tall and slender and do not abruptly narrow to form the fertile portion. in fact, this is impossible, for while the sori completely cover the upper pinnæ they also occur on the tips of nearly all the others. Of Osmunda cinnamomea frondosa, Prof. McLouth writes entertainingly on another page. The cost of packing and mailing the free ferns last year exceeded the revenues received for that purpose. This year the cost of these specimens to members will be five cents for one specimen, and two cents for each additional species. Specimens of the "fern allies" and the smaller ferns are especially desired for distribution. Large ferns are not desired as they increase the cost of mailing. Specimens of any fern offered for a year are sent free of postage to all who present ferns for distribution. Address all communications on this subject to Willard N. Clute, Binghamton, N. Y.

Obituary.

By the death of George Franklin Curtiss the Chapter loses one of its most enthusiastic and energetic members, and many in the ranks mourn the loss of an entertaining and generous correspondent. Mr. Curtiss was born in Derby, Conn., Sept. 2, 1861. He was the son of George H. and Frances Curtiss, and a grandson of the late Horace Casteline. From a child he was a

great student and lover of nature and made extensive collections of insects, snakes, shells, plants and minerals. At the age of thirteen he entered the Episcopal Military Academy at Cheshire, Conn., graduating with honors in 1878 He passed successfully the entrance examination to Dartmouth College but was prevented from entering by ill health. In 1882 he entered the School of Technology in Boston and there spent four years of study. After graduation he accepted a responsible position with the Thompson-Houston Electric Co. and remained in their employ until his death. He spent one winter in the Bahamas, and at one time was in California for nearly a year. In 1894 he spent the months of March and April in Jamaica, where he made a study of the ferns, and brought home a large and valuable collection. Mr. Curtiss inherited a weak constitution and for years struggled against that insidious disease, consumption. In October, last, he went to Boston to prepare for a trip to California, hoping to be benefitted in health thereby, but died very suddenly on October 8, 1895, at the age of thirty-four. One who knew him personally writes: "He was a quiet, thoughtful man, with many resources, and leaves a host of friends who mourn his loss."

WOODSIA SCOPULINA.

Prof. C. F. Wheeler of Agricultural College, Mich., writes that he has collected this fern at the lower falls of the Menominee river in Michigan. This species is new to the flora of that state, and the station mentioned is the most easterly one known for the plant. Camptosorus occurs in but three places in Michigan so far as known; on quartzite in Keweenaw county and on limestone in Alpena county.

THE world belongs to him who has seen it.—*Lubbock.*

A LEAF like that of the fern, the proudest of all plants in the structure of its foliage.—*Flagg*

The Linnæan Fern Bulletin.

A QUARTERLY DEVOTED TO FERNS.

Official Organ of the Linnæan Fern Chapter.

Subscription, thirty-five cents per annum.

Advertising Rates given upon application.

Articles upon any subject in fern study solicited.

WILLARD N. CLUTE, EDITOR AND PUBL'R, BINGHAMTON, N. Y.

Entered at the postoffice, Binghamton, N. Y., as second class mail matter.

In beginning our fourth volume we wish to call attention to the fact that four pages have been added to the Bulletin and that henceforth each issue will consist of sixteen pages. The size of the pages has been nearly doubled also, but the subscription price will remain the same. Other improvements, including illustrations, will be made as soon as circumstances warrant. In 1895 we published almost as much original matter relating to ferns as all the other botanical publications in America put together. This year we shall do even better, and on this ground ask for the subscription and aid of every person interested in ferns. We shall continue to publish the most instructive matter to be obtained, and believe that all who subscribe will receive full value for their money. Can you, as a fern-lover, afford to go without this journal?

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A YEAR'S subscription to this journal will be given for every meritorious article on ferns sent us before the end of January.

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THE readers of this magazine in the South and on the Pacific Coast are invited to send us notes on the ferns of their respective localities for publication. They are less known though surely as interesting as those of the Eastern states.

THERE are ten persons who are pretty well acquainted with the ferns to one who is familiar with the "fern allies."—the scouring rushes, club-mosses and quillworts. Articles on these plants will be especially welcome.

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ARRANGEMENTS have been made whereby the Bulletin becomes the official organ of the Linnæan Fern Chapter for the present year. Copies of it will be sent free to all members of the Chapter.

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THE value that attaches to the situation in which a fern grows may be judged from the article on the Fragrant Shield Fern in this issue. Who, after reading Mr. Bates' description, will be unable to look intelligently for this rare little fern.

***

WE have in preparation for the April issue an article on the Schizæa, one of the rarest of ferns. Several other interesting articles will make it an unexcelled issue. A copy will be mailed to any address for four two-cent stamps.

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IN preparing and planting a fern garden there is room for much artistic work on the part of the gardener The graceful fronds lend themselves to very beautiful grouping and should not be set primly in rows as some other plants are. Notes and plans in this line are requested.

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THIS issue will come into the hands of many persons who are not especially interested in ferns, and to such we would suggest that they subscribe for the journal for the general knowledge of the subject which it will give them. No matter in what branch of science you are interested, you will find it to your advantage to know our common ferns, an introduction to which is quickly obtained through this magazine.

NOTES.

—All books or pamphlets on scientific subjects received will be reviewed in this column.

—Complete sets of this journal can no longer be had at this office. We offer a limited number of sets beginning with No. 4, at 35 cents a set. Order now; our supply will not last long. A few single copies of various issues are offered at 3 cents each.

—Among the better class of natural history publications received should be mentioned the new "Avi Fauna," of Los Angeles, Cala., "The Iowa Ornithologist," of Salem, Iowa, official organ of the Iowa Ornithological Association, and the "Oregon Naturalist," of Portland, Ore.

—Those who are interested in growing ferns from other localities will be glad to know that several living species from California may be obtained of Mrs. M. P. Kelly, Freestone, Sonoma county, Cala. Among others may be mentioned, Gymnogramme triangularis, Adiantum emarginatum, Pellæa ornithopus, Cheilanthes Californica, Woodwardia radicans, Dryopteris filix-mas, D. munita, D. mohrioides and D.aculeata. These are offered for sale at an average price of 15 cents each, or any six for seventy-five cents. A plant each of the nine specimens will be sent for a dollar. Botanical specimens of the first four can be furnished at the price of living specimens. Those who live in the northern states should remember, when ordering, that the California fern season is much earlier than their's.

—"The Flora of the Lackawanna and Wyoming Valleys," by Professors William K. Dudley and C. O. Thurston, is a work is which botanists of any locality will be interested. This is a list of all the flowering plants and vascular cryptogams known to grow in these two valleys of Eastern Pennsylvania, with notes on their distribution, abundance, etc. Over one thousand species are recorded. While the primary value of this catalogue consists in the record of the plants shown to grow within the limits mentioned; it is also of interest as a model after which

the floras of other localities may be developed. The list consists of a hundred printed pages interleaved with blank pages for notes. 'Bulletin No. 1," issued since the "Flora" was published, brings the list of additions up to date. Fifty-one of the vascular cryptogams are mentioned. The price of the "Flora" is fifteen cents; bulletins, ten cents They may be procured of Prof. C. O. Thurston, Wyoming Seminary, Kingston, Pa.

TO ADVERTISERS.

If you have anything to sell to botanists and naturalists, this journal should receive a share of your patronage. Our rates are low compared with the number of copies issued, and we should be pleased to make estimates for any amount of space desired.

Wants and Exchanges.

One notice free to each subscriber: other notices 10 cents each.

WANTED—Nos. 89, 94, 96, 102, 104, 127, 136, 144, 157, 158, 177, 178, 182, and any other Ferns or allies not found in New England, for Nos. 68, 85, 86, 90, 93, 99, 101, 107, 110, 111, 112, 114, 120, (the variety) 131, 139, 140, 151, 166, 197 and 212. A T. Beals, Greenfield, Mass.

FOR EXCHANGE—Nos 51, 68, 85, 86, 104, 131, 181, 183, 198, 200 var, 212, 217, 230. Pilularia globulifera. C. E. Waters, Johns Hopkins University, Baltimore, Md.

I WANT Nos. 12, 13, 15, 17, 19, 24, 25, 29, 30, 37, 42, 45, 48, 52, 56, 57, 58, 59, 60, 63, 64, 74, 76, 78, 81, 82, 87, 91, 92, 98, 100, 105, 106 113 115, 121, 122, 123, 126, 129, 130, 137, 148, 150, 159, 160, 164, 167 168 and 169. Can offer Nos. 2, 8, 14, 18, 23, 31, 34, 36, 41, 46, 53, 61 67, 68, 70, 75, 77, 84, 85, 88, 90, 93, 94, 96, 99, 101, 107, 108, 110, 111, 114, 120, 125, 127, 128, 133, 136, 138, 139, 140, 142, 147, 151, 152, 154, 155, 156, 158, 162, 163, 166, 170, 171, 173, 172, 180, 181, 183. James A. Bates, Randolph, Vt.

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BOTANICAL DEPARTMENT

edited by Willard N. Clute.

MISS C. A. SHEPARD

has contributed to the April number an article entitled "A Plea for Wayside Flowers." Two other articles will appear in this number on the subject of Ferns & Flowers.

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The NATURALIST PUBLISHING CO.,

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. . . THE LINNÆAN . . .

FERN BULLETIN.

VOL. IV. APRIL, 1896. NO. 2.

HOW I FOUND SCHIZÆA PUSILLA.

WE were paddling around the shores of Grand Lake, Nova Scotia, in a birch-bark canoe, searching for a nice beach, intending to take a bath. It was the middle of July, 1879, and we had gone all around the island where the loons nested, whose quavering call at night added so much charm to that wild and lonely lake; but nowhere had we found a smooth stretch of beach. Finally we crossed over to the shore where the bits of bark from the tannery had floated down in the stream and formed a delta on the shore where it emptied into the lake. Here were brilliant masses of the fragrant Utricularia cornuta, and among the stones near by, grew that rare little European plant, Littorella lacustris, which at that time was known to occur only in one other station in North America. We landed a short distance beyond, attracted by the fragrance of a bed of the beautiful pink orchid, Pogonia ophioglossoides. Here the shore sloped away in a smooth sandy beach, but the bank formed a turfy seat, about a foot higher than the beach, matted and held together by the stout, black rhizomes of the Royal Fern, and Sweet Gale. I knelt down to dig up a good plant of the orchid, so as to get the roots, and there, growing under the edge of the miniature bank, I found Schizæa pusilla. The plants were very small, and the fertile spike still immature, but I recognized it, though I had not seen it growing before, be-

cause I had specimens of it from the pine barrens of New Jersey. I left it growing for a month longer, and then collected a few specimens, nearly all there were, none of them more than two inches in height. One of these was sent to Prof. Eaton at Yale, one to Dr. Gray at Harvard, one is in the Herbarium at Columbia College, and two others are in private collections. Dr. Gray was delighted to receive his, and wrote to me that he had seen long ago, the specimens collected by De la Pylaie in Newfoundland, in the Herbarium of the Jardin des Plantes at Paris, but that everyone had supposed, until I had discovered it again in Nova Scotia, that the locality cited was incorrect, and that the specimens must have come from New Jersey. He wrote a notice of its rediscovery for the *Gazette*. (*Bot. Gaz.* **5**: 4 1880.) Prof. Eaton wrote a notice for the *Bulletin*, (*Bull. Torr. Bot. Club*, **6**: 361, 1879.) and included it in the Supplement of his "Ferns of North America" just then approaching completion. (Eaton, *Ferns N. A.*, **2**: 275, 1880.) He sent me in return a small package of rare ferns, among them the smallest and rarest one found in the United States, Trichomanes Petersii, which grows on wet rocks in Alabama, the only representative we have of a small group of the large tropical family of the Filmy Ferns. Prof. Mackay, of Nova Scotia, has since searched in the locality where I found it, but in vain. He said that the shores of the lake had been swept by forest fires, and it has probably been exterminated in that way. It is one of the few remaining survivors of a time when a tropical flora was distributed as far north as Greenland, as the Schizæas are now represented by only a few tropical species, all odd and very highly differentiated. It is not difficult, however, for even an expert botanist to overlook it, and one of the members of the Torrey Botanical Club is known to have gone to the pine barrens of New Jersey to search for it in a locality where he had found it before, and to have come home as he supposed without it, and found it among some sundews which he had brought in his box for his classes. At the time the American Association for the Advancement of

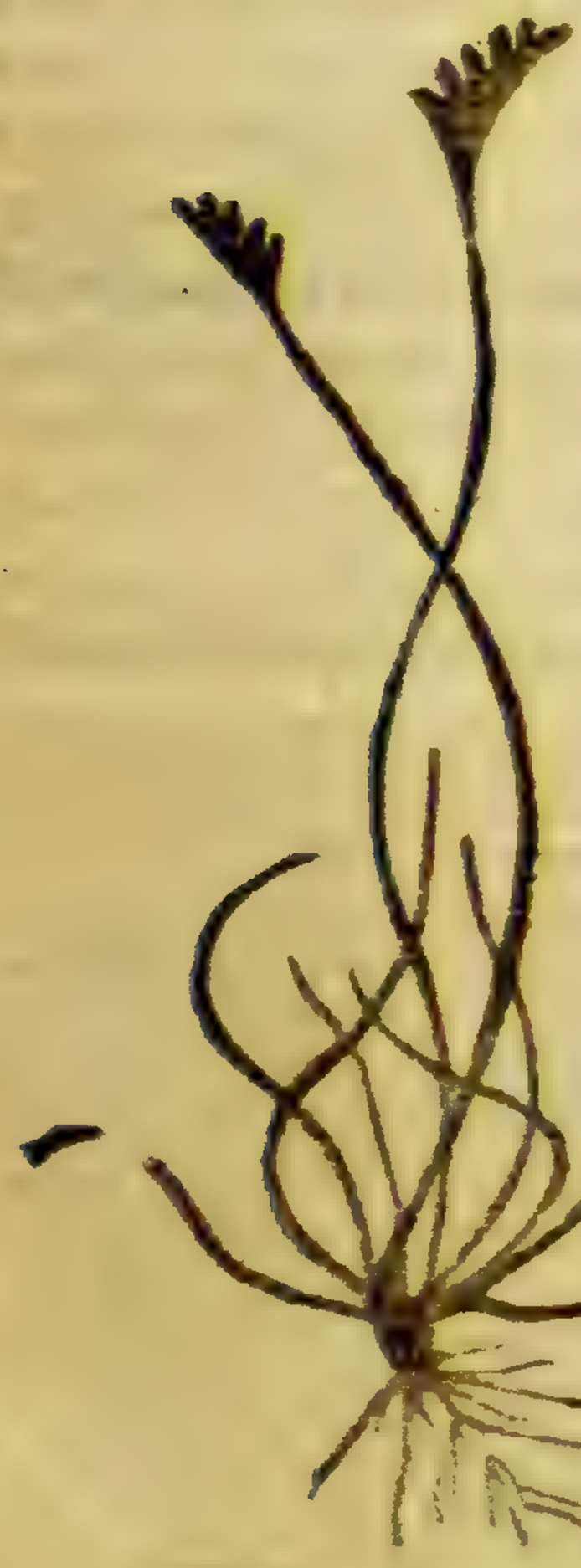
Science met in Philadelphia in 1884, the members of the Academy of Natural Sciences organized a botanical excursion to the barrens near Egg Harbor, and took a carload of botanists there on purpose to find Schizæa and other local plants. Several members of the British Association, which held its sessions that year in Montreal, were with us, John Ball and Mr. Carruthers as well as Dr. Gray, Mr. Redfield, Mr. Canby, and Dr. Bernard Brinton and Mr. I. H. Martindale, who acted as guides. We were shown a large patch of the rare and curious little fern which is the subject of these notes, and to many of the party previously known only by dried specimens. The guides told us that they had discovered it entirely by accident, while sitting near the railroad track eating their luncheon. We all gathered fine specimens, some of them six inches high, as well as of the plant usually found growing with it in New Jersey, Lycopodium inundatum Bigelovii. We have since searched for it in vain at Tom's River, New Jersey, where it is known to grow, and we incline to the belief that it is owing to its wiry leaves and small size that it is known from so few localities.—*Elizabeth G. Britton, Torrey Botanical Club, New York.*

Variations in Asplenium.

A writer in a recent issue of *Meehans' Monthly* calls attention to a variation in the fronds of Asplenium Trichomanes, which he has found. Those which endure the winter are small and lie flat on the ground. The pinnæ are oval or sometimes nearly circular. The stipe and rachis are thread-like and irregularly curved. The spring and summer fronds are erect and much longer than the others, with the pinnæ triangular and farther apart. The stipe and rachis of these fronds are quite stout. The latter fronds seem to be always fruitful, the first only occasionally so. Has anyone else noticed this difference? The ebony spleenwort, a near relative of the fern under discussion, shows much the same variance between the fertile and sterile fronds. The former are tall and erect, the latter short and spreading. Are the pinnæ of the two forms also dissimilar?

SCHIZÆA PUSILLA AT HOME.

ANYONE who has seen this odd fern growing in its native haunts will probably concur in the opinion held by some that while it is looked upon as one of the rarest of ferns its small size and its habit of growing in the midst of other low plants have no doubt caused it to be passed over by collectors in many localities where it really exists. This should be an encouragement to collectors to keep the fern in mind in their field excursions with a view to adding new stations for it to those now known. The finding of a rare plant in a new locality is always a source of especial pleasure to the discoverer, besides being an item of value to botanists in general. S. pusilla was first collected early in this century at Quaker Bridge, N. J., about thirty-five miles east of Philadelphia. The spot is a desolate looking place in the wildest of the "pine barrens," where a branch of the Atsion river flows through marshy lowlands and cedar swamps. Here amid sedge-grasses, mosses, Lycopodiums, Droseras and wild cranberry vines the little treasure has been collected; but though I have hunted for it more than once my eyes have never been sharp enough to detect its fronds in that locality. In October of last year however, a friend guided me to another place in New Jersey where he knew it to be growing, and there we found it. It was a small open spot in the pine barrens, low and damp. In the white sand grew patches of low grasses, mosses, lycopodium Carolinianum, L. inundatum and Pyxidan-



SCHIZÆA PUSILLA.

thera barbulata, besides several small ericaceous plants and some larger shrubs, such as scrub-oaks, sumacs, etc. Close by was a little stream, and just beyond that a bog. Although we knew that the Schizæa grew within a few feet of the path in which we stood, it required the closest sort of a search, with eyes at the level of our knees, before a specimen was detected. The sterile fronds (curled like corkscrews) grew in little tufts, and were more readily visible than the fertile spikes, which were less numerous, and, together with the slender stipes, were of a brown color hardly distinguishable from the capsules of the mosses and the maturing stems of the grasses which grew all about. Lying flat on the earth with face within a few inches of the ground was found the most satisfactory plan of search. Down there all the individual plants looked bigger, and a side-long glance brought the fertile clusters more prominently into view. When the sight got accustomed to the miniature jungle quite a number of specimens were found, but the fern could hardly be said to be plentiful, and all that we gathered were within a radius of a couple of yards. This seems indeed to be one of those plants whose whereabouts is oftenest revealed by what we are wont to term a "happy accident," as, for instance, when we are lying stretched on the ground resting, or as we stoop at lunch to crack an egg on the toe of our shoe. I know of one excellent collector who spent a whole day looking for it diligently in what he thought to be a likely spot, but without success, when finally just before the time for return came, as he was half crouching on the ground, scarcely thinking now of Schizæa, its fronds suddenly flashed upon his sight, right at his feet. The sterile fronds of Schizæa pusilla are evergreen so that the collector may perhaps most readily detect it in winter, selecting days for his search when the earth is pretty clear of snow. The surrounding vegetation being at that time dead the little corkscrew-like fronds stand out more prominently. The fertile fronds die before winter sets in, but their brown stalks nevertheless frequently continue standing long after.—*C. F. Saunders, Philadelphia.*

WOODWARDIA VIRGINICA.

THE only spot in which I have found this fern, was described in my notes last July as "an acre or so in which fronds grew as thick as grain in fields." That description is literally true. The tall, erect fronds, springing singly from the long creeping rootstocks at distances of a few inches, and nearly uniform in height, singularly resemble evenly sown grain. The habitat is the margin of a swampy place near a small lake that is tributary to Lake Michigan. The swamp is nearly dry, and supports a considerable growth of cranberry and other Ericaceæ, also Spiræa and other species of shrubby plants. The Woodwardias grow in a bed of Sphagnum moss. In this moss and the loose earth below lie the numerous rootstocks. These appear much larger than they really are on account of the dense coat of long, chaffy scales. The ferns and moss occupy the ground almost to the exclusion of other herbaceous plants. This species produces both sterile and fertile fronds, indistinguishable in size and form. The fertile form seems to be the more numerous, and the degree of fruitfulness varies from an abundance of sporangia that almost covers the back of the frond, down to narrow lines on only a few pinnæ.—*C. D. McLouth, Muskegon, Mich.*

MY FERNERY.

SEVERAL years ago my little fernery in the garden became overcrowded, and I determined to build a larger one. A load or two of rocks were brought, and a strong man engaged. We decided to build the fernery under a weeping willow tree, near the lake, where the dew forms early and late, thus giving plenty of moisture, which all ferns require. The north wall is high, and slopes to the east and west, while the south wall is very low, and the whole quite irregular in shape. Leaf-mould was prepared and the space between the walls filled up, sloping towards the south, and the ferns trans-

planted. More ferns were added, and also some rare violets, graceful columbine, dicentra and other springtime favorites. Then came a few orchids and a lovely Solomon's seal, that gives us each year flowers like a string of pearls tipped with sea-green. Some hardy sedums were added to fill up some of the chinks in the rocks, and many a fern and other plants sprung from the woodland soil brought home with some of the treasures. Here is the walking-fern, and the Ophioglossum vulgatum and beside it Botrychium Virginianum, usually so hard to cultivate. Then here is the dainty Cystoperis fragilis, and the sweet-scented Phegopteris hexagonoptera, and the graceful Adiantum pedatum, Osmunda regalis and O. cinnamomea, and many others, all quite at home and growing luxuriantly. This fernery is one of the most attractive features of the garden; from the time when the first woolly heads peep through the ground to see if spring has come; during the days of rapid growth, when all seem to be in a hurry to appear in summer dress; until they fade in autumn days. Nearby, under that clump of sweet azaleas, are growing some plants of Lygodium palmatum; they require a very moist soil, and some shrubbery for the slender stems to twine upon. It seems not long since the first ferns were planted in this fernery, but lichens are beginning to grow upon the rocks, and we shall soon have a lichen garden in connection with the fernery.—*C. Antoinette Shepard, New Britain. Conn.*

THE FERN GARDEN.

WHEN one has once become interested in the study of ferns, he is disinclined to let an occasional trip afield be his only chance for observing the growing plants. But by selecting some cool, shady place under his own trees or on the north side of the house for a fern garden, the plants can be studied at leisure. The ferns themselves seem to take kindly to the plan for there is scarcely a species that refuses to grow

in such places. After being started they thrive for years with little care. If the soil is heavy it should by made light by the addition of sand, peat, leaf-mould, etc.. and it should be well drained, for however much ferns like moisture, they will not grow in water. There are endless ways of arranging the ferns, but it should be remembered that the plants will grow best if given situations as near like the localities in which they grew as possible. The few larger ferns that will endure the sun may be planted in other places. Of those that remain, the larger ones should be planted in the background so that they may not overshadow the rest. For the rock-loving species, nothing is more suitable than a loose wall with pockets of earth between the stones, in which they may be planted. In making such a wall the stones should be slanted downward so that the water which falls on them may run in and moisten the roots. For the same reason the higher courses of stone should not overhang those below. On the very top the common polypody may be planted. It delights in such places, seeming able to endure much drouth. Other suitable species for the rockery are the smaller spleenworts, the two bladder ferns, the walking leaf and the cliff ferns. Of the ferns to be planted in the earth, the genus Dryopteris, with the lady fern and Dicksonia will furnish plenty of specimens for the background, while in front may be placed the oak, beech, maiden hair, sensitive, Christmas and rattlesnake ferns. It is surprising how many new facts will appear with the unrolling of the fronds. Without effort one will come to know the habits of the species as well as if he had made a determined attempt at the study in the woods and fields. Even the natural environment of the plant may be observed, for in transplanting each fern a curious assemblage of plants are brought with it and these will spring and grow, adding interest to the place. The gold-thread, partridge-berry, violet, crinkle-root, mitre-wort, and a host of others will appear from time to time and with their blossoms heighten the beauty of the others.

FORKING FRONDS.

CONSIDERABLE interest is still taken in the subject of forking fronds. Mr. Newlin Williams, of Philadelphia, records several fronds of Woodsia Ilvensis, some of which were once and others twice forked. Mr. Will R. Maxon, Oneida. N. Y, adds forking fronds of Botrychium ternatum dissectum, Osmunda cinnamomea and Asplenium trichomanes, the latter twice forked. The list is further enlarged by Mr. Alvah A. Eaton, of Seabrook, N. H, who writes: "I have several fronds of Dryopteris marginalis giving a good series from a very slight forking to two perfect fronds from one stipe, and also D. spinulosa intermedia in the same series, but do not find it so common. I have two plants of D, simulata that are considerably divided at the top, and two of Phegopteris phegopteris gathered from one root that have two perfect fronds from one stipe which forks at the summit to bear them. I have Dryopteris thelypteris with two fronds from one stipe, and sterile fronds of Onoclea sensibilis in various degrees of forking. I have also D. Boottii and D. spinulosa dilatata, the former variously forked at the end, the latter with two well developed fronds from one stipe. According to my observations the species showing the greatest tendency to fork is D. acrostichoides, especially the variety incisa. I find, however, that this seldom forks deeply, showing a tendency rather to become cristate on all the pinnæ." This makes twenty-four American species that are known to fork. Are there others?

THE LINNÆAN FERN CHAPTER

OF THE AGASSIZ ASSOCIATION.

What the Chapter Is.

The Linnæan Fern Chapter of the Agassiz Association was organized in March, 1893, for "the study of ferns by correspondence, the exchange of specimens, and the publication of the

knowledge obtained." The Chapter started with but four members, and has succeeded beyond the most sanguine hopes of its promoters. It aims to be a representative society of fern students and welcomes to its ranks everyone who is interested in ferns. There is no iniation fee. The dues of active members are $1.00 annually; of associates, 50 cents. The former have entire control of the Chapter. Both classes receive free all Chapter publications. This journal is the official organ and is also sent free to members. During its existence the Chapter has been the means of putting many fern students in communication with one another, has distributed several rare ferns to its members, and has contributed to fern literature numerous original articles. Suggestions for increasing the Chapter's usefulness will be welcomed from anyone. Applications for membership should be made to C. E. Waters, Secretary; Johns Hopkins University, Baltimore, Md.; or to Willard N. Clute, Pres., Binghamton, N. Y.

The Chapter Ferns.

Through the kindness of Mr. C. F. Saunders we are able to offer fronds of the rarer chain-fern, Woodwardia areolata, to the Chapter. An excellent article on this fern will appear in the July *Bulletin*. We can also supply a few each of the species offered in the January number. It has been found very difficult to pack the larger ferns so that they will go through the mails without breaking, and ferns more than eight inches high are not desired for distribution. Anyone who can collect the smaller ferns for this purpose will help our members and themselves by doing so. Specimens of the ferns offered during the year are sent free of postage to those who contribute specimens for distribution. Only members can obtain these ferns. They are offered to them postpaid at the rate of 5 cts. for one species and 2 cts. for each additional specimen. Address, Willard N. Clute, Binghamton, N. Y.

New Members.

Following are the names of those who have become members of the Fern Chapter lately, and have not yet been recorded in the *Bulletin*: Active—Dr. J. H. Raymond, 173 Jarolemon St. Brooklyn, N. Y.; C. F. Saunders, 307 Walnut St., Philadelphia, Pa.; Mrs. Judith H. Coffin, Newburyport, Mass.; Dr. G. L. Parmele, Hartford, Conn.; Alvah A. Eaton, Seabrook, N. H.; Mrs. Mary McAlpine, Portland. Me. Associate—Mrs. Charles B. Graves. New London, Conn.; Richard H. Rich, Beverly, Mass.; W. E. Saunders, London, Ontario, Canada. A revised list of our members will soon be issued.

George Franklin Curtis.

In regard to the bent of Mr. Curtis' mind while in the Episcopal Academy of Connecticut, Mr. E. D. Woodbury, vice-president of the institution, writes:—"During the latter part of his course he showed a fondness for scientific pursuits, spending much time in collecting specimens for his cabinet, and studying the life and habits of all insects that came within his reach. He also developed considerable taste and skill in drawing which in the light of later events was evidently a step preliminary to the final devotion of his life to electrical work. Mr. Curtis was warmly attached to Cheshire and its surroundings, and up to the last years of his life was accustomed to pay frequent visits to the school."

The scientific side of Mr. Curtis' life is ably presented by Prof. C. J. Maynard, who writes of him thus:—"That Mr. Curtis was an enthusiastic lover of nature goes without saying. His interest extended into all or nearly all departments of biology, but he was especially devoted to the study of insects. His collections in this department were very extensive and all of his specimens were particularly fine. While with me on a trip to the Bahamas in the spring of 1894, he was of great assistance in

ull that I did. He discovered a species of land shell new to science, which I have since named Strophia Curtissi, and by his patient research pointed out many interesting facts in regard to the life history of this and other species of molluscs. He was quick to grasp ideas and early became a convert to my theory in regard to the limited distribution of the species of Strophia and unhesitatingly proclaimed his belief in the correctness of my conclusions. Opinions like these, coming as they did from one whom I knew to be habitually critical and careful in expressing his ideas, were of particular value to me On the Bahamas, Mr. Curtis not only studied the land shells, but also gave much attention to the corals, sponges and other marine animals He was of course, especially interested in the insects which occur on the islands and made considerable collections of them. Although I have known Mr. Curtis intimately for ten years or more, I was brought more directly in contact with him on the Bahama expedition, and there learned to prize his friendship very highly. In fact, all who knew him became attached to him, and he made many friends wherever he went. He was especially kind and considerate to the creoles whom we gathered about us as assistants, and one of the saddest tasks which I have yet to perform will be to impart the news to these humble friends of his that Mr. Curtis is dead and that they will never see him again.

Death of Mrs. Clute.

After a short illness, Mrs. Harriet Northrup Clute, wife of Willard N. Clute, died at her home in Binghamton, N. Y., Feb-21, 1896. She was twenty-seven years old and had been married but little more than a year. She is survived by her father, mother, husband and infant daughter. Mrs. Clute was a consistent christian and her amiable disposition and never failing cheerfulness won her a wide circle of friends. Although not a member of the Chapter, she was known and loved by many of its members who will be grieved to learn of her death.

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No reader of this journal can fail to note the steady improvement in all its departments. With the addition of illustrations another step forward has been taken. It is hoped that those who appreciate the efforts being made to advance the study of ferns will be prompt to subscribe, and thus lend their support to the work. Another enlargement of the magazine is contemplated, and as soon as two hundred more subscriptions are received we promise our readers a greater amount of reading matter without increase in price. Now is the time to subscribe.

***

SHORTLY after the January issue was mailed we were deluged with applications for sample copies. These were sent as long as the supply lasted, but many received only parts of copies or none. We regret that we were obliged to disappoint anyone, and send a copy of this issue to all who applied in order to explain.

***

To induce a large number to subscribe at once, we offer this journal for one year, beginning with next issue, for thirty cents, if the subscription is mailed within ten days of the receipt of this. Subscriptions mailed later *must* enclose thirty-five cents.

We have twenty copies of the January issue that were saved for our own files; they may be had at ten cents each. One will given free with each thirty-five cent subscription.

***

LYCOPODIUM SELAGO and L. lucidulum frequently bear little gemmæ in the axils of the leaves, which are capable of producing new plants. In regard to them Gray's Manual remarks: "For their true nature, see Sach's Lehrbuch, Eng'l trans., p. 411." Will some one who has access to this work give us a short note on the subject.

***

ASPLENIUM TRICHOMANES INCISA has been catalogued as occurring in California and Vermont. Mr. Jas. A. Bates, who has collected many years in the latter state, doubts if it is found in his locality at all. In sending specimens of this fern collected in California, he says it is there the common form if not the only one. This variety is very different from the species, and observers in other sections should be on the watch for it.

***

WITH the two excellent articles on Schizæa published in this issue as guides, fern lovers in all sections are helped a long way toward finding this fern, if it is to be found. It is hoped that before the season is over some of our sharp-eyed readers will be able to report it from other places.

***

THIS issue may be called the Schizæa number. In July we shall devote considerable space to the recently discovered Dryopteris simulata. Any of our readers who can send us facts bearing on this fern are cordially invited to do so. We shall be glad to hear from every student who has found it in his locality.

***

Our thanks are due to several correspondents for photographs of interesting fern localities and groups of ferns. We hope our circulation will soon become large enough to permit the reprinting of such things.

NOTES.

—In a pamphlet entitled "The Flora of the Sand Hills of Nebraska," recently issued by the Department of agriculture, it is noted that Equisetum lævigatum is common in the meadows aloug the Middle Loup river, and is there considered a valuable plant for hay.

—Mr. W. E. Saunders notes that the Bruce Peninsula, which juts up between Georgian Bay and Lake Huron, produces an abundance of Dryopteris lonchitis. Not far away, at Owen's Sound, Scolopendrium is found. We are promised an article on the ferns of this locality soon.

—Too much cannot be said in favor of that excellent little volume entitled "A Fern Book for Everybody," by M. C. Cooke, and published by Frederick Warne & Co., 3 Cooper Union, 4th Ave., N. Y. In upwards of a hundred pages the ferns of Great Britain are treated in a very readable, though strictly scientific manner. The uses, habits, relations and superstitions of ferns here find a place with much else that especially concerns the various species. Twelve colored plates and numerous illustrations in the text add much to the value of the work. There is no book on American ferns with exactly the same scope. The price is fifty cents.

—One of the oldest and best of botanical publications is the Bulletin of the Torrey Botanical Club, a monthly journal that has been published consecutively since 1870. It began with four pages, gradually increasing until in 1895 over forty-four pages monthly, with many full-page illustrations, were issued. The journal publishes a large number of the papers read before the Torrey Botanical Club, as well as many other articles which go to make up this very readable journal. In the monthly "index to recent literature relating to American botany" is given a full list of current botanical literature. The Bulletin is edited by Dr. Nathaniel Lord Britton, of Columbia college, New York City. The subscription price is two dollars per annum.

—In the "Flora of Warren County, Kentucky," a list of about 750 plants with common and scientific names, issued by Sadie F. Price, Bowling Green, Ky., we notice several rare ferns, among which may be mentioned Asplenium Bradleyi, A. pinnatifidum and Trichomanes radicans. The ferns and fern allies number thirty-six.

—Probably the finest colored plates of American ferns to be had are those that appear from time to time in the pages of Meehans' Monthly. The publishers of this journal are doing for American botany what the governments have done for the science in other lands. The full-page colored plates, one of which appears in each issue, are executed by Prang & Co., and accurately and naturally delineates some native fern or wild flower. Not only are the flowers and leaves shown, but the roots, seed-vessels and parts of the flower as well. Each plate is accompanied by two pages of text relating to it, but this is only one of numerous good things about the magazine. By a system of condensation it is made to cover a wide range of topics, and as much real information is crowded into its twenty pages as appears in many journals of twice its size. All who are interested in wild flowers and nature will be delighted with it. It is published at Germantown, Pa.

Wants and Exchanges.

One notice free to each subscriber: other notices 10 cents each. The numbers are those used in the Fern List.

WANTED—Nos. 1, 7, 13. 14, 28, 29, 43, 44, 49. 55, 58, 59, 60, 66, 76, 78, 79, 86, 91, 113, 123, 153, 157. Can offer Nos. 31, 36. 41, 68, 88, 90. 93, 99, 104, 108, 110, 112. 120, 133, 142, 145. 151, 152, 154, 162, 170 and 183. SADIE F. PRICE, Bowling Green, Ky.

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FERN BULLETIN.

VOL. IV. JULY, 1896. NO. 3.

THE RELATION BETWEEN THE STERILE AND FERTILE LEAVES OF DIMORPHIC FERNS.

THE dimorphism existing between the leaves of certain ferns which have expanded sterile leaves, and smaller ones devoted entirely to the production of spores, presents in some species very interesting problems which have hitherto received but little attention. This note to the Linnæan Fern Bulletin is suggested by the note on Osmunda cinnamomea frondosa in the January number by Mr. C. D. McLouth. That note is a very interesting one to me, since I have been engaged for two years with experiments on two other dimorphic ferns belonging to the genus Onoclea, viz., O. sensibilis and O. struthiopteris, both of which grow in abundance near Ithaca. Readers of the Bulletin will recollect a form of the sensitive fern which was named by Dr. Torrey, O. sensibilis obtusilobata, and which was even described as a distinct species by Schkuhr as O. obtusiloba. As will be seen by consulting recent editions of Gray's botany, this has recently been considered by some as simply an abnormal form.

At the meeting of the Rochester A. A. A. S., Prof. Underwood presented a note on the form of this fern, and suggested that the intermediate fruiting leaf was the result of some injury to the sterile leaf. This was opposed by several botanists When I published my little book on the biology of ferns, I called attention to this peculiar form, and accepted Prof. Underwood's suggestion as the one which is in accordance with what some of us believe to be

a law of nature. When this book was reviewed in *Nature*, this theory was severely criticised, and this criticism was the immediate cause of my undertaking the experiments to determine the cause of this abnormal form, for I firmly believed that these forms could be readily produced by artificial treatment in the case of this species. I accordingly took my knife, and going to the spot where the fern grows in great abundance, cut off the leaves (about the 10th of May, 1894) which were then about one foot high. In the course of another month the new sterile leaves which had grown up were cut down, and again in two weeks, so that the third crop of sterile leaves was cut off before there was any sign of the fertile leaves appearing, either in the experiment plot, or where the leaves had not been disturbed. The latter part of June and early in July the plants which had been operated on had developed a large number of the abnormal forms of the fruiting leaf, while in the adjacent plots where the leaves had not been disturbed none of the abnormal forms were present. Twenty-five or thirty of the plants, which showed a series with every gradation from perfect fruiting leaves to completely sterile leaves, were taken to my laboratory and photographed, and all of these were preserved natural size, so that any "doubting Thomas" who should come along could see the specimens as a convincing argument of the effectiveness of the experiment. In all of these gradations the terminal portions of the leaves, pinnæ and pinnules were more expanded than the proximal portions, and the sporangia also showed every gradation of development, or rather every stage of degradation and sterilization. In some cases these gradations were shown in all stages on a single leaf, and in others the only sign that the leaf had once intended to be fertile, was the presence of rudiments of the indusa on fully expanded and broad leaves.

In the summer of 1895 similar experiments were performed on the other species, O. struthiopteris, and similar results were obtained. This is the more interesting, since to my knowledge no abnormal form of the fruiting leaf in this species has been reported, though it would not be surprising if we should hear of some

who have found them. These abnormal leaves look very curious indeed in the ostrich fern, and they do not reach near the size of the sterile leaves, while they often do in the case of the sensitive fern.

While these facts are extremely interesting to all who love ferns, there are certain problems connected with the more fundamental relation between the fertile and sterile leaves which are of absorbing interest to me just now, and of which I cannot here speak because it would make this article too long. But I assure any reader of this note that I should be only too glad to receive specimens of any ferns in which these transformations have taken place, and if anyone should come across similar transformations of the pistils of flowers to partial leaves, the plant (entire plant sent so as to keep in a fresh condition) would be very welcome to me. Mr. McLouth has, I think, rightly interpreted the influence of the fire on the Osmunda cinnamoea, but from some preliminary experiments which I started on this same fern last year, I should think that the fire ran over the ground the season prior to the appearance of the abnormal leaves, instead of the same season; but until I have opportunities for further experiment I shall not offer an opinion.—*Geo. F. Atkinson, Ithaca, N. Y.*

HOW I FOUND DRYOPTERIS SIMULATA.

I AM asked how I first came to find Dryopteris simulata. Well, sixteen years will have passed next August, since at Folly Mill woods, Seabrook, N. H., referred to by Whittier in "My Playmate," I first collected Dryopteris simulata as a form of "lady fern." Although having much interest in general botany at the time, nevertheless my knowledge of the Filicineæ was somewhat less than at present, and the new fern passed off very well as a kind of Asplenium filix-femina, which was then one of the few ferns I pretended to know, and in fact, even now when I meet with D. simulata where it has been left out in the heat of the sun by the woodcutters I am obliged to examine it closely to distin-

guish it from that form of A. filix-fœmina which grows in exposed situations, and the resemblance between them is equally as striking when the young plants first start in the spring. Three years later, in looking over my herbarium I found that I had collected the same or a similar fern as Dryopteris thelypteris. I gave the matter a little examination and concluded that the fern was a curious kind of Dryopteris Noveboracense, and let the subject drop. During the summer of 1890 I became especially interested in the vascular cryptogams, and the peculiar fern was again brought to mind. Being unable to come to any satisfactory conclusion I submitted fronds to the late Prof. Eaton, of Yale College, who became much interested in them and requested me to send him roots that he might grow them, which I did. I had previously sent him roots and fronds of another fern, which he decided to be those of a hybrid between Dryopteris cristata and D. marginalis, and advised me to publish a description of it. Upon my replying that I preferred that he should undertake it, he sent my specimens to Mr. Davenport to whom I also referred the other fern. Facts which have become known to me since Mr. Davenport named and published an account of D. simulata have fully confirmed his judgment that this is a new species. In all situations it keeps its characteristics except when growing intermixed with Dryopteris Noveboracense, when by careful search intermediate forms can be found, just as in the same circumstances intermediate forms can be found between Phegopteris phegopteris and P. hexagonoptera. I have seen a square mile of white birches under which D. simulata was the only fern to be found.

In every locality known to me for Woodwardia areolata, there also is to be found this Dryopteris, and it is apparently in such situations that it attains its best development. I would further remark that my working plan has been, never to be satisfied with single specimens in making a collection of the species of any particular group, but to search diligently for variations and to obtain them from every possible source.—*Raynal Dodge, Newburyport, Mass.*

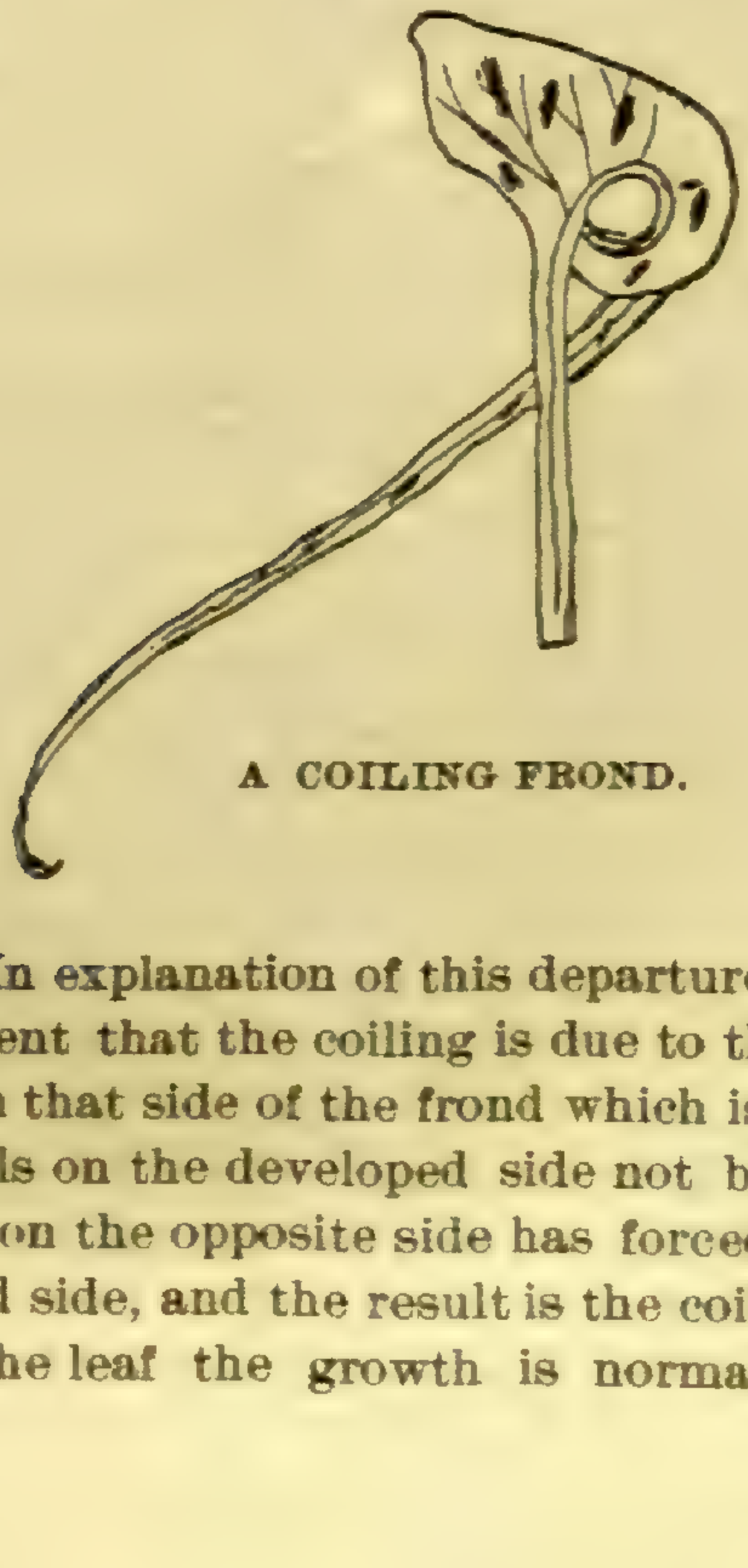
Plate I.

DRYOPTERIS SIMULATA DAV.

FIG. 1, FERTILE FROND FIG. 2, A FRUITING PINNA.
FIG. 3, A PINNULE MAGNIFIED TO SHOW VENATION

A COILING FROND.

LAST summer a curious shaped frond of the walking fern was noticed in the editor's fern-garden, from which the accompanying illustration was made. This frond has made two complete revolutions in a plane parallel to the surface of the leaf, or sidewise. The coils begin near the base and so far as they extend only one side of the frond is developed; otherwise it is like any normal frond, and has produced spores. The coils are nearly flat and apparently were formed when the frond was unrolling by two revolutions slipping sidewise instead of uncoiling toward the tip. This may point out one of the ways in which the climbing



A COILING FROND.

ferns originated. In explanation of this departure from the normal type it seems evident that the coiling is due to the combined pressure of the cells on that side of the frond which is developed. The pressure of the cells on the developed side not being balanced by an equal pressure on the opposite side has forced the midrib over to the undeveloped side, and the result is the coiling described. At the apical end of the leaf the growth is normal, both sides are

equally developed and the pressure on either side being balanced by a corresponding pressure on the opposite side, no coiling takes place.

The substance of the above note was taken from the pages of *Mechans' Monthly*. To the courtesy of that magazine we are also indebted for the use of the illustration.

DRYOPTERIS SIMULATA IN MARYLAND.

TO see in the *Botanical Gazette* for December, 1894 an article entitled, "Two New Ferns from New England," was probably sufficiently startling to many a botanist who had come to think that there were no more discoveries to make in that part of the country. Mr. Davenport, after describing a hybrid species, gave a description of what is undoubtedly a new species, intermediate between D. thelypteris and D. Noveboracensis. Its name, however, was not given on account of its resemblance to these two ferns, but because it "simulates" a peculiar "woodland form of Asplenium filix-femina." Since it was described, numerous localities for it have been reported in New England, and it has been found even in Missouri. So it would be well for us all to look for a fern which is distinguished from D. thelypteris by its simple venation, larger sori, and glandular indusia; from D. Noveboracensis by its thelypteris-like fronds; and from both by its general aspect. This latter is indefinable, but one who has seen a bed of its dark, green fronds can never mistake it for either of the two allied species, although it most closely resembles D. Noveboracensis.

Here in Maryland, in Anne Arundel county, there is a pond, or better a bog with some unabsorbed water, just a few minutes walk from the road to Annapolis, yet so well hidden by woods and defended by such an intricate system of obscure wood roads, that we were several times led completely astray before two of us, one January day, followed the stream until we came to our goal. Coming down through the thickets along the stream we saw numbers of dead fronds of what looked very much like D. thelypteris and

which were dismissed as such without further thought beyond a mental note of the locality. The following October (1894) the ferns did not look "right" and they were referred to Thelypteris and then to Noveboracensis and back again in a few minutes. Finally it was determined to put one or two fronds in my vasculum for future reference. So they were put away and forgotten until the startling article appeared in December. **It did not take long** to send one of those *two* fronds to Mr. Davenport, who wrote in reply, "your plant is good A. simulatum."

This fern, then, is to be looked for in "woodland swamps," as it thrives "best in deep shade, near cool moist hummocks, in beds of sphagnum," or, as with us, frequently in light, rich loam. It fruits later than either of the allied species, the spores ripening with us about October first. Several other species of ferns are to be found with it, as well as other interesting plants. Dryopteris spinulosa intermedia and D. cristata are plentiful, and one clump of D. Boottii was found last May. A form of Osmunda regalis with very broad fronds, few pinnæ and enormous pinnules is often seen, as is also O. cinnamomea. The two Woodwardias are common, and a few plants of Asplenium filix-femina have been found. Going down towards the pond we come across sterile D. thelypteris and Lycopodium dendroideum. Finally as we reach the open we find fertile thelypteris, O. regalis, acres of mud, covered with Eriocaulon, Sarracenia, Drosera, Lycopodium inundatum Biglovii, Utricularia and others, while the surface of the pond is covered with Nuphar, Potamogeton and other water plants. Diatoms, desmids, and other algae swarm. In the woods where it is drier one can also find Pteris aquilina, Tephrosia Virginiana, Lupinus, Crotalaria, mountain laurel, sheep laurel, Rhododendron viscosum, and R. nudiflorum. Along the roads are several violets, wild pinks, arbutus, elethra, staggerbush, swamp sumach, as well as the swamp magnolia,—hosts of things!—*C. E. Waters, Johns Hopkins University, Baltimore, Md.*

Nearly a hundred varieties of the lady fern are known.

ASPIDIUM CRISTATUM × MARGINALE DAVENPORT.

THIS species should have been included in the Linnæan Fern Bulletin No. 9 if it was intended to have the list of North American ferns complete for the area given. There can be no good reason, except that of unintentional oversight. for leaving it out. It has an absolute right to recognition. It has been properly published, was accepted by Prof. Eaton, and is accepted without hesitation by those eastern botanists who have seen the original material upon which it was founded, I need not assure those who know my extreme caution in such matters, but for those who do not, let me say that it was not hastily considered nor decided upon, but the most careful investigation and study of two seasons was given to it from living plants in nature, and under cultivation on my own grounds, after its acceptance by Prof. Eaton, before publication, I therefore reaffirm its right to recognition, and later on, if I am spared, will submit such evidence in favor of it as will demonstrate this fact.—*Geo. E. Davenport.*

[The fern in question was omitted from the Fern List through a misunderstanding. As soon as the nomenclature question becomes settled a new list will be issued and will include this fern. —Ed.]

WOODWARDIA AREOLATA.

THIS fern, while not reckoned one of the rarest, is nevertheless by no means common. Thomas Meehan, in his excellent work, "The Native Flowers and Ferns of the United States" speaks of it as being mainly confined to the marshes of the Atlantic states. In Underwood's "Our Native Ferns," a later work, its range is given as Maine to Florida, Michigan and Arkansas. Where it grows at all it will usually be found in considerable abundance. The writer collected it on September 21st, last, in Mercer county, N. J., in the middle and southern counties of which state, according to Britton's catalogue, it is common. Through the boggy shades of a low-lying wood a little stream ran, and in the wet

sphagnum ground close by, the fern was growing in some profusion, both amid the tangled undergrowth and also more openly in the paths made by the cattle in their wanderings. The fern is interesting in having two distinct forms of fronds. The sterile are not unlike the sterile ones of Onoclea sensibilis, a fact which induced Willdenow, an early botanist, to name it Woodwardia onocleoides. The fertile are so dissimilar as to seem like fronds from an entirely different plant, The segments are linear in shape and heavily loaded with the chain-like sori, while the stipe, which presents no espescially marked features in the sterile frond, in the fertile is of a shiny chestnut color and forms an attractive adjunct of the fern. In some spots I noticed practically no specimens of any but the sterile form growing, while in others the fertiie form predominated. With the latter, however, there seemed always some dilapidated remains of a sterile frond near by. In some instances good specimens of both were found growing side by side, springing from the same root-stalk, which is creeping. Among my specimens were two or three fertile ones with segments broader than normal on which the sori were only partially developed, thus making a sort of link between fertile and sterile—having characteristics of both without the complete features of either. In common parlance this fern, as well as its less rare cousin, Woodwardia Virginica, goes by the name of the "chain fern," from the arrangement of the sporangia in linear parallel sori, thus presenting the appearance of links in a chain. I was struck with the noticably heavy weight of the fertile fronds when green, which I take to be due to the abundance of the sporangia and the thick, leathery texture of the indusia. The fronds, both sterile and fertile, if held to the light and examined with a hand lens, present a beautiful sight. Throughout the entire extent of the frond runs a network of delicate veins, forming innumerable little spaces or meshes, technically known as areoles—an especial characteristic of this species. Each sorus forming half a link in the complete chain, will be seen to be enclosed by encircling veinlets like a fortress by its moat.—*C. F. Saunders, Philadelphia, Pa.*

THE POLYPODY'S RELATIVES.

IN the usual experience of the fern-lover the large or abundant species are known long before the shyer ones—those that are restricted to certain peculiar localities—are noticed. And yet it often happens that when we once know where to look for the latter, we find them as plentiful as any of the others. This is especially true of three relatives of the common Polypody. Polypod-

FIG. 1—BEECH FERN.

ium vulgare is to be found crowning nearly every rocky ledge. Its stiff, leathery fronds are endowed with ability to resist the drouths that often occur in these barren places, but its relatives of the genus Phegopteris differ from it in habitat almost as much as their fronds do in texture. Their more delicate fronds seem to require

FIG. 2—OAK FERN.

a greater amount of moisture and accordingly we find them in the damp woods. or along dripping ledges. The beech fern (Fig. 1) has the trait of rooting in some crevice of the rock where the spray from falling water can moisten its foliage. Its triangular

fronds with the lower pair of pinnæ deflexed and standing forward never show off to better advantage than here. This fern is at home in the damp woods also, and in such situations the oak fern (Fig. 2) usually grows with it. Few of our native ferns are dainter than this. Its lower divisions, larger than the others, give to the plant the semblance of three ferns in one. Those who have never found it should search for it in places where the soil is moist, rich and shaded. A third fern (Phegopteris hexagonoptera) that seems a connecting link between these two, will be found almost as abundant when it is once identified. It so nearly resembles the beech fern in shape that it is often taken for that species. It is clearly distinguished from it however, by the more distant pinnæ, the many angled rachis, formed by the decurrent lower pinnules, certain differences in the formation of the apex of the frond, and even by the scent of the bruised foliage.

OUR MISCELLANY.

Has anyone ever caught and named the curious malady that often afflicts the lady fern (Asplenium) by causing the loss of a pinnule here and there over the entire frond? In some places one must search several clumps of ferns to find a single perfect specimen. In this connection a cynic has remarked that this was doubtless called the lady fern because there are so few perfect specimens.

* * *

Of what significance is the odor of ferns? It has been concluded that the fragrance of flowers enables them to attract insect visitors, but the fern can do without them. Adiantum trapeziforme of the West Indies is said to emit a very disagreable odor, "something between that of a tomato plant and an African marigold," Davilla moorana from Borneo has a pungent smell, and the odor from both these is most noticeable at evening. Among North American ferns, Dicksonia and Dryopteris fragrans are fragrant. Why are they endowed with their peculiar odors?

Of all the recent changes of nomenclature, the one least popular with fern lovers was the substitution of platyneuron for ebeneum in the name of the little Asplenium. Ebeneum and ebony spleenwort seem so appropriate that we are loth to discard either.

* * *

Mrs. M. L. Stevens reports finding Dryopteris simulata three years ago in Roxbury in a swamp where fine specimens of D. spinulosa grow. This is said to be the station nearest to Boston from which this fern has been reported. Miss Stiles reports it from West Roxbury also.

* * *

A writer in the *Asa Gray Bulletin* notes the evident preference of the ebony spleenwort for shaded, sandy banks in parts of Connecticut. It often grows in thin grass with but little moisture. A great difference in the size of the fruiting plants is noticed, some being a foot high, while others are smaller. This same difference in the size of fruiting plants is found in Botrychium Virginianum and others. Who can explain it?

* * *

A subscriber in New York, who has actively interested herself in making the Bulletin known to others, has the following to say regarding the journal. "I like this little paper for the opportunity of exchanges that may come, and for the enjoyment of the experiences of its collectors like informal talks. Students can all join hands through it, and give or get as they have or have not, of either plants or knowledge."

* * *

Mr. James A. Bates writes that he has thirty-six species of Polypodium. Referring to the shape of the fronds, he says: "I have a specimen of P. hymenophylloides which is so finely divided that the divisions are not larger than fine pen marks, and P. pseudo-grammites looks like grass. P. Hildebrandii is most beautifully cut into lines also, but P. spectrum is like a great dock leaf in structure, fifteen inches long and ten wide, and simply sprinkled over with small dots of sori. I also have two little specimens, one from Scotland and one from Italy, that are as tough as leather."

A subscriber having seen the statement in print that the sporangia of Dryopteris marginalis are black, asks what color they really are. She had always supposed them to be brown. Is there a difference in color in different localities?

* * *

Mr. Raynal Dodge, by discovering two new ferns in such a well-explored part of our country as New England, has clearly demonstrated the value of studying ones own locality thoroughly. He writes that he has also recently found a peculiar species of Isoetes, an account of which will soon be published.

* * *

Mr, D. S. Ebersold of Oceanus, Fla., who is engaged in collect- the curios of that region, notes that the Polypodium polypodiodes is there found growing on trees and is known as the Resurection fern. The living plants shipped to the north arrive withered and apparently dead, but by placing the roots in water the fronds soon become fresh and green. When removed from water the fronds again shrivel, following in reverse order the process by which the new fronds unfold. The edges of the pinnæ roll toward their centers, the tips curl toward the rachis, and the apex of the frond coils downward towards the stipe.

* * *

Mr. F. H. Horsford, a veteran cultivator of ferns and wild-flowers, presented a paper on "Some Vermont Ferns under Cultivation " at the last annual meeting of the Vermont Botanical Club. From this the following notes of interest to fern cultivators are gleaned: The soil should be largely light, sandy loam, mixed with peat and a small proportion of crushed brick. For the limestone species add old mortar. Pockets in rock work should contain at least four inches of soil. Transplant in spring as soon as the frost is out of the ground. If moved later, it should be in July or August. When moved in the summer all the fronds should be cut off and the plant should be kept shaded and moist that it may be well rooted before winter. Never let the roots get dry; put them in a wet sack at once. Allow no stagnant water at the roots, and do not try to cultivate them under maple trees.

Mrs. Julia M. Hunter reports the occurrence of Asplenium viride near Kent, Conn.

* * *

Mr. Raynal Dodge is at work on a booklet dealing with the ferns and fern allies of New England, with special reference to their time of fruiting. It is expected to appear before Autumn.

* * *

Apropos of finding Schizæa in new stations, Mrs. Elizabeth G. Britton, whose excellent article on this fern appeared in the April Bulletin, writes that Prof. Eaton thought it might be found at intermediate points between Nova Scotia and New Jersey, and hoped to receive it from some of the sandy swamps in Connecticut and Rhode Island.

* * *

Mr. C. E. Waters writes: "It may not be generally known that Dicksonia is peculiar in sending off rhizomes from the base of the stipe. The new rootstalk may spring from a point nearly or quite an inch above the old one. A study of the stems and rhizomes will show that the intermediate portion is a true stipe, and not a vertically-growing rhizome. No lens is needed."

* * *

Dr. Charles Atwood refers to Sach's statement, written thirty years ago, that the roots of the Lycapodiaceæ are the only roots known to branch dichotomously, and asks if others have since been discovered. Isoetes at least should be added to this list. On page 276 of Campbell's "Mosses and Ferns" will be found the remark that "the roots [of Isoetes] are numerous and dichotomously branched."

* * *

Upon the authority of *Meehans' Monthly* it is stated that Pellæa gracilis has not been recorded from stations farther south than the Pennsylvanian Alleghanies. It is generally regarded as being restricted to limestone rocks. Prof. C. H. Peck, State Botanist of New York, writes that he has found it in two places in the Adirondacks where there were mere pockets of limestone. It was growing on this rock, but no where else in the vicinity.

Miss Sadie F. Price notes that the walking fern is called "wall link" in parts of Kentucky.

* * *

The *Botanical Gazette* for May, 1896, contains an article by Mr. George E. Davenport on some Mexican ferns collected by Mr. C. G. Pringle. Four new species are described, two of which are figured.

* * *

Additions to the list of forking fronds continue to appear. Mr. C. E. Waters sends instances of forking fronds in Asplenium Bradleyi, Polypodium vulgare and Botrychium Virginianum, bringing the list up to twenty-seven.

* * *

Mr. C. F. Millspaugh notes in the Flora of West Virginia that on the summit of Spruce Knob, at an altitude of 4,800 feet, Dryopteris fragrans grows in such quantities that it is cut for fodder, being greatly relished by cattle.

* * *

In Dr. George L. Parmele's article on climbing ferns in the June number of the *Observer*, the following common names for it are given: Snake-tongue fern, climbing fern, Windsor fern, creeping fern, Hartford fern and Watson's fern.

* * *

Of ferns like Woodwardia and Osmunda that are ordinarily too large to go on a page of the herbarium, which is the better specimen, a large frond bent once, or a dwarfed frond, provided each shows the characteristics of the plant, except size, equally well?

* * *

Mr. Frederick Funston, who collected plants for the United States about Yakut Bay, Alaska, in 1892, found six ferns and three of the allies in that part of the world. Dryopteris spinulosa and Phegopteris dryopteris were found in abundance, the former often growing five feet high. Cryptogramme acrostichoides grew plentifully among the rocks, and Lycopodium annotinum was common on the forest floor.

THE LINNÆAN FERN CHAPTER

OF THE AGASSIZ ASSOCIATION.

New Members.

Since the April Bulletin was issued the Chapter has gained nine new members, as follows: Active—Dr. Charles Atwood, Moravia, N. Y.; Charles E. Fisher, North Attleboro, Mass.; Mrs. M. A. Noble, Lake Helen, Fla.; Addison Ellsworth, Binghamton, N. Y. Associate—Guy Wilson, Greencastle, Ind.: R. D. Hoyt, Seven Oaks, Fla.; Mrs. Julia E. Campbell, Pasadena, Cala.; Miss Caroline Matthews, Waterville, Me.; C. B. Frazier, Eldora, Iowa. We heartily welcome them all. A new list of the members is in preparation and will soon be mailed. Those who contemplate joining the Chapter should do so at once in order that their names may appear on this list. Active membership costs $1.00 annually; associate, fifty cents. All are cordially invited to join.

With the list of members will be mailed an eight-page pamphlet on the popular side of fern study, entitled "Ferns and Fern Lore." Fourteen half-tone cuts illustrate the article. It will be sent free to all members.

Ferns Free.

This quarter two ferns are offered to members of the Chapter for the cost of postage. Pellæa atropurpurea is offered by Miss Elmira Noyes. Dryopteris fragrans is the gift of Mrs. W. D. Frost. The Pellæa is remarkable from the fact that is was found in company with Asplenium trichomanes, growing on a brick wall surrounding a church in Portsmouth. Va. Dryopteris fragrans was gathered in northern Minnesota in 1894, near Flint Lake, which lies between that state and Canada. A specimen of either fern will be mailed to any member of the Chapter for five cents; both will be mailed for seven cents. Those who have sent ferns for distribution within a year may have these ferns free for the asking.

Fruiting of Bimorphic Ferns.

Mr. McLouth's article in the January Bulletin relative to the fruiting of Osmunda Cinnamomea frondosa is in full accordance with my observations on this species, and I may add, the other species of Osmunda. One thing he failed to mention, and that is, the earliest attempt at fruiting is the abnormal thickening of a vein; the next step, the vein rises in a point from the surrounding surface. This is most noticable in the freaks of the Claytoniana. His surmise as to the various gradations being due to attempts to repair an injury are doubtless true, the plant being forced to turn next year's fertile fronds into the immediate economy of this year's growth. I find that this is the result invariably of destroying the first growth of dimorphic ferns, at least, of such as I am acquainted with. O. Claytoniana and O. regalis, when they are mowed in July, send up another crop of fronds to elaborate sustenance for next year's fruiting, and as this is done by sterile fronds, and as the fertile fronds have already been formed in embryo, it becomes necessary to change the destiny of these, and push them forward. The result is that they do not know whether to be sterile or fertile. I have all of these in every possible gradation, and I may say that nature's distress furnishes a good means of looking into her workshop; it is by her makeshifts we see how her work is done. The peculiarity of Onoclea sensibilis is that it sends up sterile fronds early in the season, and possibly stores food for the fertile before they develop in August and September, and the despoiling of this by mowing in the first two weeks of July is largely accountable for the form obtusilobata. I find this abundant in mowing fields in the latter part of July, and rarely elsewhere. It is certainly a makeshift of nature to guard against exhaustion: the freaks are often the result of exhaustion as well as luxuriance. I find Woodwardia areolata in every possible gradation from sterile to fertile, though I have had no opportunity to see what the results of mowing would be.—*A. A. Eaton, Seabrook, N. H.*

The Linnaean Fern Bulletin.

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THOSE who have read the pages of this journal regularly know that each issue has been superior to the one that preceded it. In order to render it still more attractive, this number has been printed with new type, and subsequent issues will be equal in appearance. Those whose subscriptions expire with this number were promised twelve pages each quarter when they subscribed, but have received much more. Those who subscribe now are promised sixteen pages, but may be sure of a greater number. The editor is trying to make this journal worthy of the support of every student and lover of ferns. All the revenues derived from it are devoted to making it larger and better. It only remains for those who want such a journal to do their part. Thirty-five cents seems an insignificant sum, but if enough subscriptions are received at this price the magazine will be made the equal of any other. Send us the addresses of those who might subscribe. Subscribe yourself, and induce others to do so. Now is the time to do it.

***

SINCE this issue will find most fern-lovers busy in the collection and study of their favorites, we have signalized it by printing an extra number of pages. As soon as our circulation warrants it this will be the regular size of the journal.

WITH this issue we present a plate of Dryopteris simulata which has never been figured before. Our illustration was made from material furnished by Messrs. George E. Davenport and Raynal Dodge.

* * *

AMONG forthcoming attractions may be mentioned articles on Cheilanthes lanosa (C. vestita), Equisetum litorale, and Isoetes Engelmanni. The October Bulletin will devote considerable space to Ophioglossum vulgatum and Scolopendrium Scolopendrium. Notes on these two species are requested.

* * *

WHEN in want of botanical supplies you can do us a favor by patronizing the firms that advertise with us and mentioning that you saw their advertisement in the Bulletin. When advertisers generally learn the value of a card in this journal we shall be better able to serve our readers. Every advertisement counts toward strengthening the magazine.

* * *

THE editor expects to be present at the meeting of the Botanical Society of America, which will be held in Buffalo, N. Y., August 21st and 22d, and will also attend the meetings of the American Association for the Advancement of Science held the following week. He would like to hear from readers of this journal who purpose being present, with the idea of becoming better acquainted.

* * *

THOSE members of the fern Chapter whose vacations take them into the haunts of the rare ferns can greatly aid less fortunate ones by collecting specimens for free distribution. Twenty specimens of one kind will be sufficient. Any person who presents such specimens is entitled to specimens of all others offered during the year, free of postage. Fronds more than eight inches long are not desired as they are difficult to mail, Specimens of Isoetes, Salvinia, Azolla, Pilularia, and the rarer Equisetums, Botrychiums, Ophioglossums and Selaginellas are especially desired. Address all correspondence on this subject to the editor of the Bulletin.

NOTES.

—After expending considerable money in getting out a very creditable first iesue of the *North American Naturalist*, Mr. Jolley, the publisher, has decided to discontinue the magazine.

—Among the corresponding Chapters of the Agassiz Association the Wilson Ornithological Chapter takes a prominent place from the work it is doing in the study of birds. The Chapter's official organ, the *Bulletin*, publishes the results of the members' study. It is edited by Mr. Lynds Jones, Oberlin, Ohio, and is issued bi-monthly.

—Fern lovers who are also interested in general botany should send for a copy of the *Asa Gray Bulletin*, a bi-monthly issued by the Gray Memorial Botanical Chapter of the Agassiz Association. The journal is of especial interest to students and teachers, and stands in the same relation to the Gray Chapter that the Fern Bulletin does to the Fern Chapter. Its articles are all contributed by wide-awake students of the science. The publisher, Miss C. G. DuBois, Waterbury, Conn., will send a sample copy upon application.

—With the March number of the *Botanical Gazette*, the financial management of that journal passed into the hands of the University of Chicago. The editorial control remains unchanged, the financial transfer enabling the editors to make the magazine better than ever. Those who would keep up with the advances in botany should possess the *Gazette*. It is devoted to botany in its widest sense, and contains original papers on the anatomy development, physiology and taxonomy of both phanerogams and cryptogams, besides numerous shorter articles. A special feature is found in the pages of "Notes and News," where items of current information about botanists, their doings and writings. find a place. The *Gazette* is published the 15th of each month and contains forty pages or more each issue. The illustrations average over three full-page plates to each issue. Sample copies may be had by addressing Prof. J. C. Arthur, Perdue University, Lafayette, Ind.

—"The Structure and Development of the Mosses and Ferns,' by Douglas H. Campbell, has been received from the publishers. Macmillan & Co., New York. In this octavo volume of 544 pages is to be found the latest information regarding the plants of which it treats. The past ten years have been noteworthy for the activity with which the mosses and ferns have been studied, and the result of this work, coupled with Dr. Campbell's own extensive investigations have enabled him to produce a volume indispensible to botanical students. The first two hundred pages are devoted to the mosses and contain detailed accounts of all that is at present known of their life histories. Attention is paid also to their affinities and classification. The rest of the work deals with the ferns and "fern allies," in which these plants receive the same thorough treatment as the mosses. The value of the volume is further enhanced by two hundred and sixty-four illustrations. No fern-lover's library should be without it. The price is $4.00.

—We have received from the publishers, Messrs. Frederick Warne & Co., New York, a neat little 12 mo. volume entitled "Wayside and Woodland Blossoms," a pocket guide to British wild flowers for the country ramblers, by Edward Step. Within its pages four hundred species are clearly described. One hundred and fifty-six species are figured in colors, and twenty-two more in black and white. Although the volume treats of British wildflowers the American flower lover will find much in it to interest him, since many of the plants described belong to our own country as well as to England. Considerable space is devoted to the folk-lore connected with the various species, the derivation of the common and scientific names, and other things of interest to those who frequent the fields and woods. While the coloring of the plates is at times faulty, the drawings are accurate and one wonders how the publisher can give so much for so little. The price is $2.50. Another volume is in preparation and will be issued soon.

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NUMBER 4.

The LINNÆAN FERN BULLETIN

Devoted to the Scientific Study of Ferns.

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WILLARD N. CLUTE, Editor. - BINGHAMTON N. Y.

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. . THE LINNÆAN . .

FERN BULLETIN.

VOL. IV. OCTOBER, 1896. NO. 4.

TRICHOMANES RADICANS.

IN the summer of 1893 I found a single small clump of Trichomanes radicans under one of the sandstone cliffs crowning the ridges that follow Green river in its course through this (Warren) county. The fact that Prof. Sachs and others have assigned it to the lowest place in the fern family—a link between this and the mosses—renders it of great interest; though I am certain it would prove so to all fern lovers on account of its striking and odd appearance. The cliffs along the ridge and also following the little streams that flow into the river, are worn into little ravines and grottoes that are covered with laurel, called by the country people here the "ivy," hence I was not surprised to find one of these little creeks called "Ivy Creek." This stream has a fall of over one hundred feet. Shelving rocks jut out one over the other all about this fall, and under one of these I found the fern. I have since looked in many such places, but have been disappointed in finding more of it.* Prof. Hussey found it in similar places in two neighboring counties in 1875. He has thus written of it in the Kentucky Report for that year: "I find it in many localities, always under rocks, or in moist earth, far under overhanging cliffs, at least where moisture never fails, and the direct rays of the sun do not reach during many minutes of the day. Usually the fronds are bedewed with moisture trickling from the rocks on which they grow."

It has been reported from other counties in Kentucky, and mention is always made that it is found growing beneath overhanging ledges of sandstone, where it is kept moist by water from the rocks above. One of the Liverworts (Marchantia) has been reported as growing in company with it. Prof. Hussey in this report gave a very interesting account of the life history of this fern. "The fronds evidently remain active for several years. In no case have I ever seen a frond, which seemed recently unfolded, develop its spore vessels. A season of repose, of longer or shorter duration, occurs after its development before it put forth its little cups, from the bottom of which the bristles grow, and at the base of which the sporangia develop and cluster. But what seems still more curious to me is the fact that the crops of sporangia are not all formed and ripened at once; but they are successively developed at the base of the lengthening bristle. I have seen these bristles more than half an inch long, and still beset at the base with ripening sporangia, the scars left by those long since fallen being still visible all along the bristle. I think the life of a fertile frond may be for as long as four or five years. It may not be out of place to add that the fronds were generally filled with spore vessels." He also wrote that the extinction of this fern is near at hand, and is due to the fact that numerous flocks of sheep seek the protection of the overhanging cliffs during the winter and feed upon the fern. I think this must have proven a true prophesy, as I have within the past two or three years visited places where one might expect to find it, yet it was not found to grow, and the only place I have found it was inaccessible to sheep. I found the Asplenium Bradleyi near the plant of Trichomanes radicans -a single clump. On the sandstone cliffs ferns and mosses ran riot. Aspidium spinulosum intermedium grew in the greatest profusion from base to summit, while A. pinnatifidum and Cheilanthes lanosa grew in the crevices. Immense rocks had fallen from the top and were entirely wrapped with Camptosorus. The plants of interest I found near were the orchids (Goodyera pubescens and Habenaria psycodes, while the bluff above was covered with laurel, two species of huck-

leberry, sourwood, a few hemlocks and other trees that are rare in western Kentucky but are more often met with in the mountains of eastern Kentucky.—*Sadie F. Price, Bowling Green, Kentucky.*

[Under a later date Miss Price writes that on the 6th of last June she found an abundance of this fern in another place along the Green river. At that date few of the fronds appeared in fruit. It was a difficult matter to pull the roots from the crevices of the rocks, but when once a few were loosened the fern come off in masses often a foot long. With the fern an undetermined moss was growing. This was sent to Mrs. E. G. Britton for identification, who writes: "The moss sent is one of the rarer Hypnums, which you will find in Lesq & James' Manual as H. Sullivanti, Spruce; but the older name and the right one is H. graminicolor, Brid. It is very rarely found in fruit, but may be distinguished by the soft yellow tufts in which it grows, the long tapering leaves which are sharply serrate, and the cells of the back are papillose." —Ed.]

A LOCALITY FOR CHEILANTHES LANOSA.

ON the 26th of July, 1895, while with a party on a camera trip to the High Rocks of the Neshoming, a stream of Bucks county, Pennsylvania, which enters the Delaware near Bristol, a clump of brown, dried, curled-up looking ferns was pointed out to me lying on a ledge of rocks in the full blaze of the afternoon sun. "Dead Woodsia," I thought in my inexperience, "killed by the drought;" and turned my attention to the graceful goldenrod just coming into bloom. The ledge on which the ferns lay overhung a gray precipice more than fifty feet in height, on the west facing wall of which a number of sturdy shrubs and herbs managed to keep a foot-hold: stunted cedars, spleenwort, wild sunflowers, goldenrod and purple nightshade, then with bright red fruit. A basswood flanked the rock wall, growing from the water's edge. At the summit of the precipice of black slate or shale, a level bit of barren ground stretched away eastward from the stream covered with typical barren-plants, goldenrod, asters, slender knot-weed, wild caraway and cedars. About a week later I had

occasion to visit the same spot again, and found another clump of ferns down near the water side with fronds six or more inches long and some of them forking. There had been a rain since the first visit, and the brown crisped clump on the rock ledge had expanded to a mass of gray-green life that surprised me much. They seemed a terrestrial or riparian resurrection plant. The fronds were about three inches long, had passed fruiting, and on the pinnules and light-brown stipes some hairs were scattered, giving a more or less woolly appearance, and the stipes did not present any jointing near the base. I carried some roots home, pressed some and planted some in my fern bed, but it was not until the next winter that a friend assured me that the specimens were the rare Cheilanthes lanosa, and not Woodsia, as I had supposed at first. This spring a little clump is thriving in my fern bed, the unfolded convex pinnules looking like blooming glaucous dew-drops.—*Nevin Williams, New Hope, Pa*

OPHIOGLOSSUM VULGATUM.

BOTANISTS generally do not consider the adder's-tongue fern as common; but we may conclude from the notes of those who have collected it, that its rarity is due, not so much to its lack of numbers, as to the fact that few collectors know how and where to look for it. The subjoined notes are given in the hope of making the task of finding it easier for those who are searching for it.

Previous to 1895 Ophioglossum vulgatum was unknown to me, and was considered very rare, only two localities being known in Essex county, Mass. Early in the year, a friend gave me two specimens. From these I got an idea of how the thing looked. On the 11th of last July, while collecting Habenaria lacera in a "bound-out" mowing field, I was delighted to notice a spike of fruit in the grass. A search revealed about sixty, just right to collect, with many unfruitful specimens. A few days later, while raking in a similar locality, I found several, within a stone's throw of the

house, demonstrating again the well-known fact that a thing once seen is easily discovered again. On the 23d of last August, while riding on my bicycle, I noticed a field that appeared to be the right locality, and an investigation showed an abundance of them. I subsequently found it in another place. This year, on May 28th, I found it in another locality just as it was coming up, and I have since found three others. I consider it abundant here, only appearing rare because growing hidden in fine grass in old mowing fields, after the red-top and timothy have died out and the finer species of Carex are coming in. A good index plant is the Habenaria quoted. I have never found it except when associated with this plant, on a cold, heavy soil. The leaf is usually hidden, or if not, is easily passed by for Maianthemum or Pogonia. Find some place where a bank slopes gradually to a brook in an open field. The brook does not matter, so long as the conditions of an alluvial soil and poor drainage are supplied. If in such a place you find Carex echinata in abundance with a little Danthonia spicata, where the dead foliage aftermath rests on the ground, beneath them you may expect to find ophioglossum. I have found fine large plants in seven inches of sphagnum, but the soil should usually be a little firmer.—*Alvah A. Eaton, Seabrook, N. H.*

Though Williamson in his "Ferns of Kentucky" gives this as not at all common in Kentucky, I find it common in southern Kentucky, especially near Bowling Green, in dry, open woods, often associated with Opuntia Rafines-

OPHIOGLOSSUM VULGATUM.

quii and the American Agave, (common here.) Has it ever been noted that it may generally be safely looked for in red cedar groves in rather open woods? I know few such places where it does not grow. It fruits the first of June here.—*Sadie F. Price, Ky.*

Like finding the four-leaved clover, it is surprising how many of these plants one can find, after becoming accustomed to their appearance. I find them in meadows which never have been broken. In old meadows they will grow in little hollows where it is richer and more moist, while again I find them on rich land that has been cleared for years. As the leaf is veinless, its identity is certain when found.—*E. C. Kent, Vt.*

Four years ago I accidentally found a few Ophioglossum vulgatum in a pasture. Since then several localities have been noted in like situations, i. e., dry pastures, on and about hummocks of "hemlock loam," where the native hemlock originally grew. It is seldom found in moist places. I know of patches where, I believe, at least two or three hundred plants could be collected in a small area from June to August.—*Stewart H. Burnham, N. Y.*

REDISCOVERY OF SCHIZÆA PUSILLA IN NEWFOUNDLAND.

IN a letter dated August 6th, 1896, the Rev. Arthur C. Waghorne says: "Mrs. Britton kindly sent me some years ago a specimen of Schizæa. I am glad to be able to say that I have collected it last year, and send specimens for her." Enclosed in the letter are two tufts of the plant, both dwarfed, less than two inches in height, but both bearing an abundance of fertile fronds, small but quite mature. The label reads "In bogs, borders of ponds. The Quarry, N. W. of Railway, Interior about 70 miles from Bay of Islands, Newfoundland, 18–9–'96." It is evident from the letter and the month (September) that the year should be 1895.

It will be remembered that this is the fern which I described in the April number of the Bulletin for this year, as having been found by me in Nova Scotia in 1879. It will also be remembered

that a specimen of it from Newfoundland is preserved in the herbarium of De La Pylaie, at the Jardin des Plantes at Paris, but that until I discovered it in Nova Scotia it had been supposed that the specimen must have come from New Jersey. The rediscovery of so interesting a plant after so long an interval of time has elapsed, shows that the plants are there but fail to be recognized. It may now be looked for with renewed hope of finding it along the coast from Maine to Long Island. Prof. Eaton stated that it had proved perfectly hardy in a little artificial bog in his garden at New Haven.—*Elizabeth G. Britton.*

MARSILEA QUADRIFOLIA.

THIS plant, originally found only at Bantam Lake, Litchfield, Conn., has now been introduced in several parts of New England. I will mention two localities that are easy of access, which may interest those living in this part of the country who have never seen the plant growing. I first became acquainted with the Marsilea in rather an interesting manner. One evening I was looking over the Botany and read the description there given. The next day, being a holiday, I made a pilgrimage to Concord, Mass., in order to visit its many points of interest. As I stood on the famous Concord bridge, looking down into the river, I saw a small patch of Marsilea growing in a sandy spot under the northern end of the bridge. I have since learned that it has been introduced in other places along the river. The other locality which I mentioned is also near an historic place. In one of the little vales south of Gallows Hill, Salem, Mass., the little hill on which the executions took place during the witchcraft delusion of 1691, a small dam has been built, making a small, shallow pond of about one acre in area. On the bottom of this pond the Marsilea grows in abundance. The plants are very large, much larger than those at Concord, and also larger than the specimens that I have from Bantam Lake.—*Richard H. Rich, Beverly, Mass.*

FERN PROTHALLI.

IT is worth the young fern collector's while to keep his eyes open for the infant stages of the fern as it emerges from the prothallus—a stage we might call the fern in its cradle. Being small the prothalli are apt to elude the most sharp sighted, but that makes them all the more worth looking for. On damp, shaded banks, on wet stones or under shelving rocks, in situations where young ferns are growing, close search may reveal the tiny green discs from the size of a pin-head up to that of ones little-finger nail, sometimes barren of fronds, sometimes with one or more minute frondlets, sometimes shrivelled up close to the roots of a plant well started in its growth. Early spring and fall have been the only seasons of the year when the writer has noticed them, though, doubtless, they may be found in summer too. To have actually seen the fern in its prothallus stage, will indicate very clearly the difference between a spore and a seed.—*C. F. Saunders, Philadelphia, Pa.*

EXTENSION OF THE RANGE OF ADIANTUM CAPILLUS-VENERIS.

ON July 10th, 1896, while collecting in Peach Orchard Glen, Schuyler county, N. Y., I noticed a small Adiantum, so different from the typical pedatum that I naturally concluded it must be capillus-veneris. As this fern had never been found in the Eastern states north of Virginia, I sent my specimen to Mr. Davenport for identification. He wrote in reply that he could not give a positive opinion from the material sent him, but that he did not see how that we could do other than to call it capillus-veneris. The specimen is sterile, and is only five inches in length. It was growing in a very moist spot between two ledges of rocks, at the side of a small waterfall. Its immediate neighbor was Cystopteris bulbifera, but near it were growing Camptosorus, Pellæa gracilis, Adiantum pedatum and Asplenium trichomanes. A second search

revealed another specimen growing at the top of the same waterfall. Quite a number of shrivelled stipes were found at the foot of each plant, and it looked as if the plants had been growing there for a number of years. Mr. Davenport writes that he does not know any good reason why capillus-veneris should not be found in New York state, and he hopes that further search may reveal its presence in larger quantity.—*F. Peyton Rous, Baltimore, Md.*

[The finding of this plant so far beyond its supposed limits is remarkable, and should lead others to closely search their localities for it. In a note to the editor, Mr. Davenport remarks that this fern grows in Utah in a latitude where it freezes, and that in his garden at Medford, Mass., plants of this species withstood two winters with only a slight covering of brush.]

OUR MISCELLANY.

Another locality for Dryopteris fragrans was found on Mt. Mansfield, Vt., last summer by Mr. James A. Bates.

* * *

Mr. Guy Wilson makes a point in favor of large fronds bent once, instead of small ones, by remarking that bending the frond allows both sides of the frond to be seen at once.

* * *

A specimen of Pellæa atropurpurea measuring over twenty-four inches long with fronds fourteen inches in length was collected at North Hector, N. Y., recently, by Mr. F. Peyton Rous.

* * *

Mr. Raynal Dodge says: "A pretty method of distinguishing between Dryopteris simulata, thelypteris and Noveboracensis is this. The spores of thelypteris are nearly black, of Noveboracensis brown, and of simulata bright brown, almost red. You will often see these red spores of simulata lying loose on the paper on which the fern is mounted." A peculiarity of the rootstalk of D. simulata, pointed out by Mr. Dodge is that the bases of the stipes of simulata are persistent on the rootstalk for a year or more, such not being the case with Noveboracensis or thelypteris.

In answer to the query regarding the color of the sporangia of Dryopteris marginalis. observers seem agreed that it is brown.

* * *

Mr. F. Peyton Rous writes, "A few days ago I collected a specimen of Asplenium trichomanes with fifty-two living fronds, besides a host of dead ones. I have often noticed specimens with dead fronds to the amount of three or four times the living ones.

* * *

Regarding the cultivating of ferns, Mr. Raynal Dodge remarks: "One of the best and most satisfactory ferns for this purpose is Dryopteris cristata Clintoniana. It starts early, grows fast, has a graceful form, grows quite high, does not easily break down and keeps in good condition until nearly November."

* * *

To provide a beautiful ornament for the house during the fall and early winter months, go to the woods in October and get the largest specimen of Dryopteris spinulosa you can find, root and all. Pot this in a jardiniere and keep properly watered. If there is a more decorative object for this season, it has not been reported.

* * *

Again we make several additions to the list of forking fronds. Miss Sadie F. Price records a forked frond of Trichomanes radicans: Mr. Will R. Maxon sends an instance of forking in Dryopteris Goldieana and Asplenium acrostichoides. Mr. W. Alphonso Murrill reports two forking fronds of Asplenium parvulum and several of Phegopteris hexagonoptera; and the editor has found a forking frond on a plant of Pteris serrulata. Several observers mention instances of Botrychium Virginianum forking. The tendency of this fern to fork seems only exceeded by the walking and the Harts-tongue ferns. Camptosorus has become noted for forking, while Mr. Maxon reports finding in one day one plant of Scolopendrium with six fronds, five of which were forked, many others that were once forked, two twice forked, and one three times forked. Our list of native ferns known to fork now numbers thirty-three.

Several of our evergreen ferns are found with fronds flat on the ground before the advent of the winter storms. An examination of the bases of the fronds shows that they are as firmly attached to the rootstalk as ever by means of their fibro-vascular bundles, but the less solid parts of the stem have decayed, causing the fronds to become prostrate.

THE LINNÆAN FERN CHAPTER

OF THE AGASSIZ ASSOCIATION.

—The Chapter is now represented in seventeen states.

– During the last quarter a copy of "Ferns and Fern Lore," and the revised list of members were sent to each member of the Chapter.

—Owing to a press of other duties. Willard N. Clute resigned the presidency of the Chapter in July. Mrs. T. D. Dershimer, who then became president, appointed Mrs. A. D. Dean vice-president for the unexpired portion of her term.

—An invitation is extended to all to join the Chapter. Membership entitles one to a subscription to the Bulletin, and copies of other publications issued by the Chapter. The ferns offered in this department from time to time are free to members only.

—Four new members have been gained since the last Bulletin was issued. Miss Harriet A. Carlton, 607 Boyleston st., Boston, Mass.; C. W. Best, Kankakee, Ill., active, and George E. Davenport, 67 Valley st., Melford Mass.; Frank E. McDonald, 619 Moss ave., Peoria, Ill., associates.

The Chapter Ferns.

The Chapter is indebted to the generosity of several of its members for specimens of five interesting ferns to be distributed this month. Charles B. Frazier sends fronds of Cystopteris bulbi-

fera and Dryopteris marginalis from Eldora, Iowa; C. E. Waters presents specimens of Cheilanthes lanosa from near Baltimore, Md., which will be of special interest in connection with Mr. Williams' article on the fern in this issue. From F. Peyton Rous come fronds of the rare cliff brake, Pellæa gracilis, collected in the locality where he discovered Adiantum capillus-veneris. Mr. Stewart H. Burnham, of Vaughns, N. Y., sends one hundred plants of Ophioglossum vulgatum, and directs that five plants be mailed as a "specimen." These will have additional value for the help they will give to those who are looking for the fern in their own locality. Any member of the Chapter may have any one of the above mentioned specimens for five cents, additional specimens, two cents each. Members who have sent ferns for distribution within the year may have any of the above by sending a request for them on a postal card. Address all correspondence on this subject to Willard N. Clute.

The Chapter Election.

The fourth annual election of the Chapter will occur in October. As required by the constitution the Executive Council has selected two candidates for each office, as follows: For president, C. E. Waters, Baltimore, Md.; C. K. Dodge, Port Huron, Mich. For vice-president, Mrs. A. D. Dean, Scranton, Pa.; Will R. Maxon, Oneida, N. Y. For secretary, Alvah A. Eaton, Seabrook, N. H.; W. Alphonso Murrill, Stanton, Va. For treasurer, Jas. A. Graves, Susquehanna, Pa.; Wm. P. Potter, Norwich, Conn.

These nominations are rather in the way of suggestions, and members may vote for any other members instead of the ones suggested. Any of these would make good and efficient officers. Mr. James A. Bates, Randolph, Vt., has been appointed Judge of Election, to whom all votes should be sent. Only active members may vote, and it is hoped that all may do so. Send in your votes on a postal card. All votes must be in by October 31st.

The Linnaean Fern Bulletin.

A QUARTERLY DEVOTED TO FERNS.

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WILLARD N. CLUTE, EDITOR AND PUBL'R, BINGHAMTON, N. Y.

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THE Dicksonian fern is a beautiful plant in any situation, but those who have only seen it growing in lowland woods and thickets can hardly imagine the beauty to which it attains in its favorite haunts. To see it at its best, one must go to the mountains, on the summits of which it often grows in such luxuriance as to give them the appearance of great meadows. In such situations its name of "fine-haired mountain fern" is no misnomer. It might also be well-named the "boulder fern," from the way it delights to spring up about the rocks on the barren mountain sides. Those who visit the upland pastures of north-eastern Pennsylvania in mid-summer will bring back with them the remembrance of great stretches of grayish or sage-green fields in which every boulder and out-crop of rock is marked by masses ef the bright green fronds of Dicksonia, over which the air moves lazily, heavy with the peculiar fragrance of this interesting fern.

STUDENTS of botany who take up the ferns find themselves led along a facinating path, deeper and deeper into the lower orders of plant life. One who knows the ferns cannot forbear to form an acquaintance with their allies, the horsetails, club-mosses and others, and when that is done the mosses stand near at hand, attractive by reason of their abundance, colors, shapes and habits,

as well as by the fact that they afford the means of out-door recreation and study at the very time of the year when other plants are the rarest. Under the snow they grow and thrive, but summer finds them just as common. It has been proposed to enlarge this magazine by adding several pages devoted to the mosses, and edited by competent authority. This will be done with the January issue, if a sufficient number are interested to justify the expense. If fifty new subscribers interested in mosses can be secured, we will add four pages each issue, and eight pages will be added if one hundred subscribers are secured. The subscription price will remain the same. To gain this end, students of the mosses must work for it. Shall there be a journal devoted to your interests? Then how many subscriptions will you send us?

THOSE who do much exchanging frequently find varieties of our common species catalogued, which even the botanies do not mention. It is a question just how much consideration to give to these so-called varieties. Since one can make several of them at will, as has been demonstrated in the pages of this magazine, clearly they are not to be ranked as sub-species, however much they may interest us by their bearing on morphological questions. Again there are other varieties which seem to result from unatural conditions of soil or position, and not from mechanical injury to their foliage, and ordinarily revert to the original form when placed in proper surroundings. While these obscure varieties may be overlooked by the collector desirous of amassing a large number of species, they are well worth our most careful study. The question of why they vary offers a tempting field for research. In such species as Botrychium ternatum it would be interesting to know for a certainty whether it numerous varieties may be made to revert to the species by proper manipulation, or whether they continue to reproduce individuals after their kind. Contributions to our knowledge of this subject will be very welcome.

DRYOPTERIS simulata has recently been reported from Walpole, Mass.

NOTES.

—Those who are interested in the selection of a national flower would do well to write to Mr. J. S. Pray, Box 2774, Boston, Mass., for a copy of the "Columbine Leaflet," in which the claims of the Columbine to be the floral emblem of our nation are very attractively set forth.

—A second series of "Wayside and Woodland Blossoms," uniform with the first volume, has been issued by Frederick Warne & Co. This contains descriptions of 325 species, with colored illustrations of 130. The two volumes treat of nearly half of the flowering plants and ferns of Great Britain.

—We are in receipt of a list of the plants at present known to grow without cultivation in Connecticut, by James N. Bishop, reprinted from the report of the Connecticut Board of Agriculture for 1895. Fourteen hundred and thirty-two species are enumerated, of which sixty-five are ferns and fern allies.

—The Pennsylvania Forestry Association have a very efficient missionary in the bi-monthly journal, *Forest Leaves*. Although issued by the Pennsylvania society, it is not devoted entirely to the forestry of that state, but may be read with interest and profit by all who lôve trees and are interested in preserving our forests. The full-page illustrations of trees are alone worth the price of the magazine. The office of the Association is at 25 North Juniper st., Philadelphia.

—So great has been the demand for back numbers of the Bulletin, that there are now less than a dozen sets of Volume IV remaining at this office. Until these are gone we will mail the complete volume for 40 cts. The first three issues of the first volume are out of print. A complete set of the others published prior to 1896 (nine in all) will be mailed for 35 cts. Only a very few are left, and these will doubtless be out of print within a month. Those who wish their files complete should order at once. The numbers issued before Vol. IV contain 92 pages the size of a postal card.

—The "Fern List"—special bulletin No. 9—is invaluable in exchanging since it saves all the labor of writing or printing one's list of duplicates. All the ferns of North America north of Mexico, are printed in this list and numbered consecutively. Abundant space for making notes is provided by the blank pages. Price 5 cents each; 40 cents a dozen.

—Publication No. 9, of the Field Columbia Museum, is a very instructive volume on the "Flora of West Virginia," by Charles Frederic Millspaugh and Lawrence William Nuttall. This heretofore little known area has been pretty thoroughly worked over by the authors with the result that 2,584 species are recorded, nearly half of which are plants lower in structure than the ferns. Several new species are described. The volume contains about two hundred pages.

—Among the better class of journals devoted to the preservation and protection of our woodlands, *The Forester*, the official organ of the New Jersey Forestry Association, takes a prominent place. At present it is issued six times a year by Prof. John Gifford, Mays Landing, N. J., but with the beginning of 1897 will be published as a monthly. Each issue contains sixteen pages of reading matter, well illustrated. Even the general botanist will find much to interest him in its pages. The subscription price is 50 cents per year.

—The well-bound and neatly printed Seventh Annual Report of the Missouri Botanical Garden has reached this office, and a very interesting volume it it. The bulk of the work is made up of three scientific papers—"Juglandaceæ of the United States," by Dr. Trelease; "A Study of the Agaves of the United States," by A. Isabel Mulford, and "The Ligulate Wolffias of the United States," by C. H. Thompson. Seventy-two excellent full-page illustrations are included. The garden reports that are not out of print may be obtained for about the cost of publication by applying to the Director, Dr. Wm. Trelease, St. Louis, Mo.

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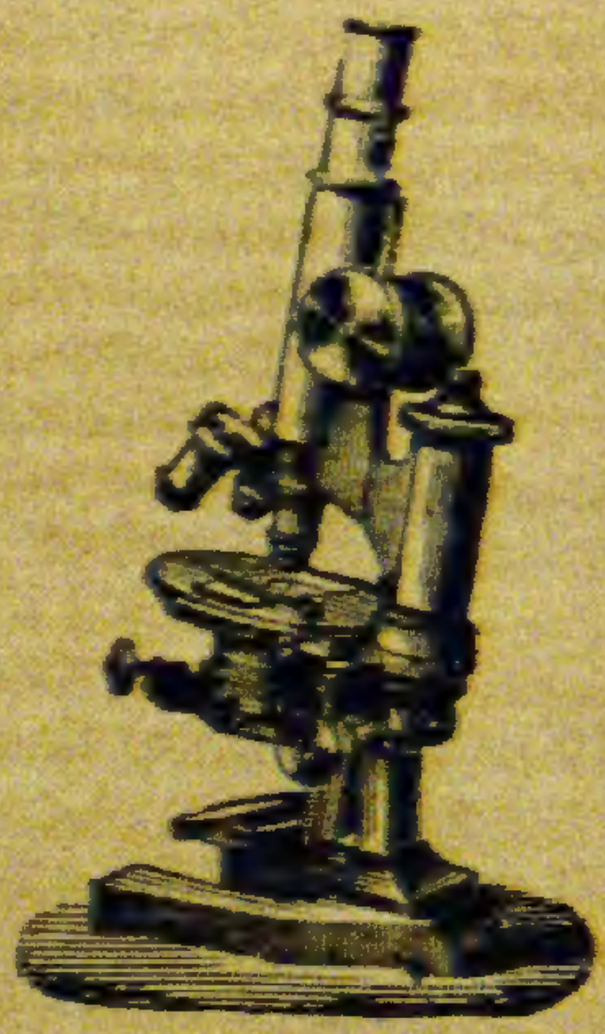

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